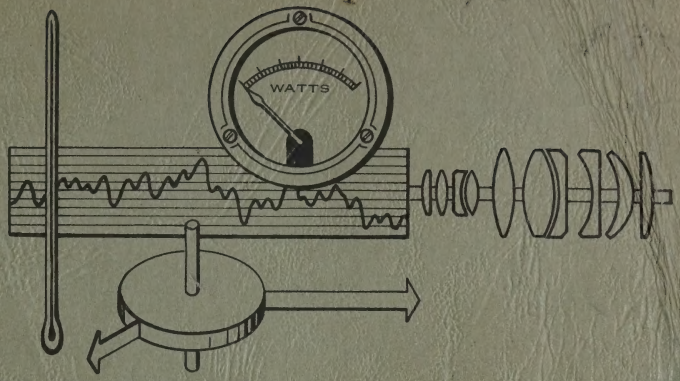
Electrical & Electronic

TEST EQUIPMENT DATA HANDBOOK



VOLUMES 14, 15, 16, 17, 18 & 19

14 POWER AND ENERGY MEASURING EQUIPMENT

15 TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

16 STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

17 GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

18 KINEMATIC TEST AND MEASURING EQUIPMENT

19 OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

FREDERICK RESEARCH CORPORATION

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ELECTRICAL & ELECTRONIC

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FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

TO THE USERS OF THIS HANDBOOK:

In recognition of the many problems associated with the selection of electrical-electronic test equipment for specific applications, Frederick Research Corporation has compiled a series of volumes which contain test equipment descriptions. The items described in the volumes are primarily those used by government agencies and contractors. At the request of the government, and in the interest of providing users with the desired information without the necessity of costly search and compilation, this firm has made this unclassified data available to government agencies and contractors for many years.

The United States Senate has twice cited the Frederick Research Corporation in the Congressional Record (1955 and 1960) for its achievements in efforts to save the government millions of dollars by avoiding duplication in government purchases and promoting the development and utilization of the best test equipment at the lowest cost consistent with quality. We believe that the material in these volumes should provide a means for users to review their test equipment requirements with a minimum expenditure of funds and technical man-hours.

FREDERICK RESEARCH CORPORATION

AIDS TO USE OF THE VOLUMES

This series of volumes has been prepared for the purpose of aiding engineers and other personnel in the selection of electrical-electronic test equipment to satisfy numerous test requirements. Thus, the format of the descriptive sheets has been specifically designed to provide the concise equipment data necessary for the selection procedure - functional description, electromechanical characteristics, reference source data, and other pertinent information. All data is as complete and current as the information available at the time the equipment description was prepared.

To save the maximum amount of time and to facilitate easy location of a particular item, the complete series has been divided into volumes based upon the accepted functional classification of equipment types. Thus, all equipments performing a specific type of test, monitoring, or measurement function are contained in one volume. For example, all equipments performing Voltage and Current Measuring functions are contained in Volume 1. Where the number of equipment descriptions in a particular class is insufficient to warrant an entire book, more than one volume (class) of equipment descriptions may be included in one book. For example, Volumes 5, 6, 7, 8 and 9 are contained in one book. The volumes are separated by green divider sheets.

Conversely, where the number of equipment descriptions is so large that a single book would be cumbersome, the volume will consist of two or more parts. For instance, Volume 10 is sufficiently large to warrant its division into parts.

Within each functional class and its subclasses, the descriptive sheets are arranged in alpha-numerical order based upon the equipment designation, e.g., ME-6B/U, ME-6D/U, ME-30/U, TS-375/U, and similarly until all descriptions in one particular class are covered.

The definitions and index of the functional classification categories and subclassifications will be found on the following pages. The alpha-numerical arrangement is provided to aid the user in his search for items in the event that only item nomenclature is known.

As an example of use of the Handbook, assume specific test requirements arise which dictate the use of a vacuum tube voltmeter (VTVM). To determine if there is an equipment having the necessary characteristics, locate the List of Handbook Volumes on Page iii in any

of the Handbook volumes and note that voltage and current measuring equipments are located in Volume 1.

In Volume 1 turn to the Electronics Test Equipment Functional Classifications to find the functional class under which VTVM's appear. From the listing, it is seen that voltage measuring equipments are assigned the functional class of 1.1 and that VTVM's are most likely included in the subclass 1.1.1 Electronic Voltmeter. A check of the functional class definitions provided on Page vii will verify this.

Next, turn to the yellow divider, 1.1 Voltage Measuring Equipment, and proceed in that section to the equipment descriptions assigned the functional class 1.1.1. All VTVM descriptions will appear in alphanumerical order within this section. Alpha-numerical listings of equipment descriptions within each subclass are provided in the Table of Contents.

Data on specific pieces of test equipment may also be quickly located. For instance, assume that one wanted to look up the characteristics of the ME-6D/U Electronic Multimeter. First, locate the correct volume as in the above example, which in this case is again Volume 1. In Volume 1 refer to the Alpha-Numerical Index, locate the item and note its functional class as being 1.1.1. Next, turn to the yellow divider 1.1 Voltage Measuring Equipment and proceed in that section to the descriptions assigned the functional class 1.1.1. The ME-6D/U is placed alpha-numerically in this class, physically located between the ME-6B/U and the ME-30/U.

A standard data format is used throughout the Handbook. Once the user has become familiar with this format, he will find it easy to locate specific data on a given instrument as well as convenient for the comparison of several instruments.

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Title	Volume
Voltage and Current Measuring Equipment	1
Frequency Measuring Equipment	2
Waveform Measuring and/or Analyzing Equipment	3
Signal Generating Equipment	4
Field Strength and Intensity Measuring Equipment	5
Impedance and Standing Wave Ratio Measuring Equipment	6
Active Networks for Test Purposes	7
Time Measuring and Counting Equipment	8
Nuclear Energy Test and Measuring Equipment	9
Multifunction Test and Measuring Equipment	10
Associated Devices for Test and Measuring Equipment	11
Passive Networks for Test Purposes	12
Standards and Calibration Equipment for Test and Measuring Equipment	13
Power and Energy Measuring Equipment	14
Temperature Indicating, Measuring, and Recording Equipment	15
Stress, Strain and Flaw Detecting and Measuring Equipment	16
Gas and/or Liquid Measuring and Analyzing Equipment	17
Kinematic Test and Measuring Equipment	18
Optical Testing, Measuring and Aligning Equipment	19

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 14

14

POWER AND ENERGY MEASURING EQUIPMENT

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 14

14

POWER AND ENERGY MEASURING EQUIPMENT

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

14. POWER AND ENERGY MEASURING EQUIPMENT

- 14.1 Power Distribution System Power Measuring Equipment
- 14.2 Audio and Video Power Measuring and Indicating Equipment
- 14.3 RF Power Measuring Equipment
  - 14.3.1 Power Measuring Test Set
  - 14.3.2 Power Indicating Equipment
  - 14.3.3 Auxiliary Equipment for Power Measurements (Detectors)
- 14.4 Electromechanical Power Measuring Equipment
  - 14.4.1 Prony Brake
  - 14.4.2 Dynamometer Equipment
- 14.5 Energy Measuring Equipment

14. POWER AND ENERGY MEASURING EQUIPMENT
Equipment designed to measure, indicate, or record electrical power, mechanical power, or energy.

14.1 POWER DISTRIBUTION SYSTEM POWER MEASURING EQUIPMENT
An equipment designed to measure power in the distribution systems.

14.2 AUDIO AND VIDEO POWER MEASURING AND INDICATING EQUIPMENT
An equipment designed to measure power in the audio and video frequency ranges.

14.3 RF POWER MEASURING EQUIPMENT
An equipment designed to indicate and/or measure power in the RF range, excluding those equipments covered by 14.2.

14.3.1 POWER MEASURING TEST SET
An equipment designed to measure power in the RF range.

14.3.2 POWER INDICATING EQUIPMENT
An equipment designed to indicate relative power level but not to make measurements of power on an absolute scale.

14.3.3 AUXILIARY EQUIPMENT FOR POWER MEASUREMENTS (DETECTOR)
A device designed for use as the sensitive element in the measurement of power. This includes thermistors, bolometers, etc., which may be used with power measuring equipments.

14.4 ELECTROMECHANICAL POWER MEASURING EQUIPMENT
An equipment designed to measure the mechanical power output or input of mechanical or electromechanical equipment.

14.4.1 PRONY BRAKE
Equipment designed to measure the power output of a rotating machine by determining the friction absorbed by a handbrake as it opposes the rotation of the machine.

14.4.2 DYNAMOMETER EQUIPMENT

Equipment designed to measure the power developed by a motor or the power required to operate machinery.

14.5 ENERGY MEASURING EQUIPMENT

An equipment used to measure energy in electrical, electronic, acoustical, or mechanical systems.

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AN/URM-22	Summation Bridge	14.3.1
AN/URM-23	Summation Bridge	14.3.1
AN/URM-24	Summation Bridge	14.3.1
AN/URM-43	RF Wattmeter	14.3.1
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TS-70/AP	Radio Frequency Wattmeter	14.3.1
TS-87/AP	Radio Frequency Wattmeter	14.3.1
TS-118/AP	Radio Frequency Wattmeter	14.3.1
TS-118A/AP	Radio Frequency Wattmeter	14.3.1
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TS-226A/AP	Power Meter	14.3.1
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Designation	Name	Functional Classificatio
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Bird 62S5	RF Wattmeter	14.3.1
Bird 67	Termaline Wattmeter	14.3.1
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Bird 611	RF Wattmeter	14.3.1
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Designation	Name	Functional Classification
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14. POWER AND ENERGY MEASURING EQUIPMENT

14.1 POWER DISTRIBUTION SYSTEM POWER MEASURING EQUIPMENT

WATTMETER TS-430/U

FUNCTIONAL DESCRIPTION:

A portable, general purpose, shielded, dynamometer type wattmeter used to measure power at DC and at low power frequencies. The meter is not compensated for instrument losses, but is compensated for normal temperature changes. It is calibrated in kilowatts.

RELATIONSHIP TO OTHER EQUIPMENT:

Similar to Weston Model No. 310, Form 1.

ELECTROMECHANICAL DESCRIPTION:

Power Supply: None required.

Frequency Range: DC and AC, 25 to 125 cycles per second.

Power Range:

0 to 3, 6, and 15 kilowatts at 30 amperes.

0 to 6, 12, and 30 kilowatts at 60 amperes.

Voltage Range:

0 to 100, 200, and 500 volts, normal.

0 to 150, 300, and 600 volts, maximum.

Power Consumption:

Potential Circuit at 115 volts, 60 cycles per second: 2.9 watts, 2.9 volt amperes.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-977800		3F25006-2
PROCUREM'T INFO.:			
PROCUREM'T COG.:	Army	DESIGN COG.:	Army, CSL
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.1
- Electronics Test Equipment -			TS-430/U

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Current Circuit at 5 amperes, 60 cycles per second: 0.81 watts, 0.95 volt amperes.

Potential Circuit Overload Capacity: 50% for ranges up to 400 volts. Above 400 volts, overload is 20%.

Current Circuit Overload Capacity: 100%.

Sensitivity at Normal Voltage: 22 milliamperes.

Scale Length: 5.25 inches.

Scale Divisions: 150.

Accuracy: 0.25%.

MANUFACTURERS' OR CONTRACTORS' DATA:

Weston Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey; Approximate Cost per Unit, $345.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

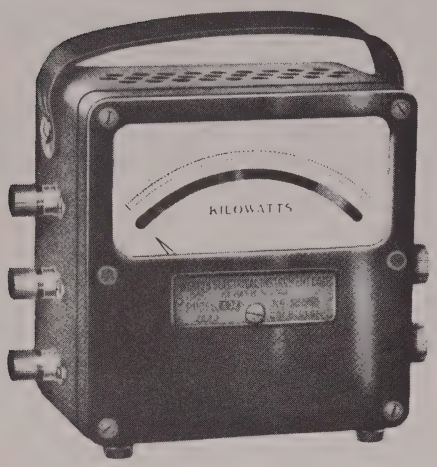
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter TS-430/U	Wood	7CAC-977800 3F25006-2	8-1/2	10-3/8	5-7/8	12

WATTMETER TS-445/U



FUNCTIONAL DESCRIPTION:

A portable, general purpose meter, used to measure DC and single phase AC power. Connections are made to three binding screw terminals on one side and two binding screw terminals on the other side. Indication is provided on a mirror type scale calibrated in watts.

RELATIONSHIP TO OTHER EQUIPMENT:

This meter is similar to Weston Model No. 432, Wattmeter.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: This meter uses an electrodynamometer type movement, with necessary resistances in series with the voltage coil and in parallel with the current coil.

Power Supply: None required.

Frequency Range: 25 to 125 cycles per second.

Power Ranges: 0 to 375/750 watts.

Voltage Ranges: 0 to 75/150 volts, AC or DC, normal.
0 to 100/200 volts, AC or DC, maximum.

Current Ranges: 0 to 5 amperes, AC or DC, normal.
0 to 7.5 amperes, AC or DC, maximum.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			3F20750-1
PROCUREM'T INFO.:			
PROCUREM'T COG.: Army		DESIGN COG.: Army, CSL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.1	
- Electronics Test Equipment -			TS-445/U

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Input Impedance: 5500 ohms on low range.
11,000 ohms on high range.
Accuracy: ±0.5% of indicated power at full-scale deflection.
Scale Length: 4.04 inches.
Scale Divisions: 75.

MANUFACTURERS' OR CONTRACTORS' DATA:

Weston Electrical Instrument Company, Newark 5, New Jersey; Approximate Cost per Unit, $102.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter TS-445/U	Molded Bakelite	3F20750-1	5-1/4	6-19/32	3-1/2	3.25

14.2 AUDIO AND VIDEO POWER MEASURING AND INDICATING EQUIPMENT

FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used for measuring the power output of audio frequency circuits. The instrument is used to test amplifiers and transformers, and to simulate the load impedance of a loudspeaker when testing the output characteristics of audio systems. Test results are indicated on a direct-reading meter calibrated in rms values for a sinusoidal applied voltage.

RELATIONSHIP TO OTHER EQUIPMENT:

The ME-2/U is the military designation for Output Power Meter General Radio 783-A.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument is equivalent to an adjustable load impedance which has a copper oxide rectifier voltmeter connected across it. The voltmeter is calibrated directly to read power dissipated in the load. The instrument is designed so that heat dissipation has negligible effect on the accuracy.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Navy	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.2	
- Electronics Test Equipment -			ME-2/U

ELECTROMECHANICAL DESCRIPTION: (Continued)

Power Supply: None.

Power Range: 0.2 milliwatt to 100 watts in 5 ranges.

Decibel Range: -10 to +50 decibels referred to 1 milliwatt.

Range Input Impedance: 2.5 to 20,000 ohms in 40 discrete steps.

Accuracy: ±2% of indicated value, except at higher audio frequencies (15,000 cycles per second), the input impedance error is ±5% for input impedances from 10,000 to 20,000 ohms.

Power Accuracy: ±0.25 decibel for full scale deflection, additional ±0.2 decibel error at lowest impedance multiplier setting when power mulitplier is set at 10.

Power Indication Frequency Characteristics: ±0.5 decibel 20 to 10,000 cycles per second, ±0.75 decibel 10,000 to 15,000 cycles per second.

Temperature: Calibrated at 25°C.

MANUFACTURERS' OR CONTRACTORS' DATA:

General Radio Company, Baker Avenue, West Concord, Massachusetts; Approximate Cost per Unit, $410.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

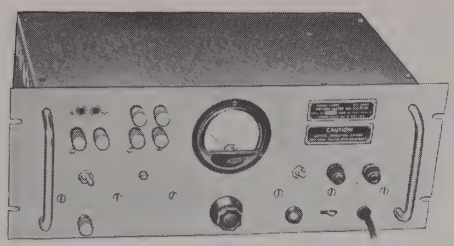
EQUIPMENT SUPPLIED:

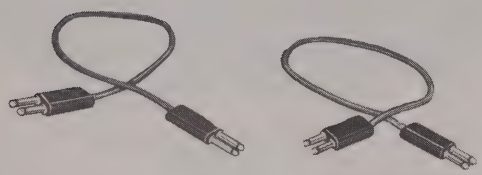
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Output Power Meter ME-2/U	wal-nut		8	18	7	17

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Output Power Meter ME-2/U					

DECIBEL METER ME-22/PCM
(METER, AUDIO LEVEL, ME-22/PCM)





FUNCTIONAL DESCRIPTION:

A portable, general purpose, amplifier-rectifier type output power meter used to test wire and wire-radio communication circuits. Measurements are indicated on front panel dial calibrated in decibels.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Power Supply: 115 volts ±10%, or 230 volts ±10%, AC, single phase, 50 to 70 cycles per second, 50 watts.
Frequency Range: 200 to 35,000 cycles per second.
Meter Range: -30 to +10 dbm.
Impedance: 600 ohms and 8,000 ohms (bridging) balanced to ground.
Accuracy: ±0.5 decibels.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			3F3307, 11-1
PROCUREM'T INFO.:	Army Spec. 71-3354		
PROCUREM'T COG.:	Army	DESIGN COG.:	Army, CSL
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.2
	- Electronics Test Equipment -		ME-22/PCM

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

DECIBEL METER ME-22/PCM
(METER, AUDIO LEVEL, ME-22/PCM)

MANUFACTURERS' OR CONTRACTORS' DATA:
Connecticut Telephone and Electric Company, Meriden, Connecticut.

TUBE COMPLEMENT:
3 JAN-6SJ7, 1 JAN-6H6, 1 JAN-6SQ7, 1 JAN-OC3/VR-105, 1 JAN-6L6GAY, 1 JAN-5Y3GT/T.

REFERENCE DATA AND LITERATURE:
TM 11-2096 (Instruction Book).

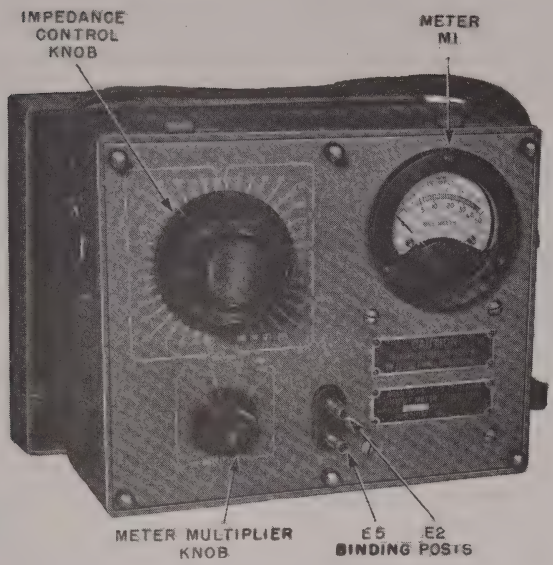
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Decibel Meter ME-22/PCM (Export Packed)	6.3	20-3/4	43	20-3/4	122

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Decibel Meter ME-22/PCM	Alum-[illegible]m	3F3307.11-1	7	19	10-7/8	25
1	Case CY-711/PCM			10-3/4	21-1/4	14-1/4	31
2	Cord, Switch-board Patching WECo. 2P13D		3E2P13D				
1	Instruction Book TM 11-2096						

OUTPUT METER TS-585B/U



FUNCTIONAL DESCRIPTION:

A portable, general purpose meter, designed to measure audio-frequency power directly in milliwatts or decibels referred to one milliwatt. This meter is used to measure power output of amplifiers, filters, oscillators, and similar equipment over its frequency range. The meter may also be used to determine the effect of load impedance on power delivered, and the characteristic impedance of transmission lines, audio amplifiers, filters, oscillators, and similar equipment. Standard radio-receiver tests such as noise pick-up level, bandwidth, selectivity, fidelity, and sensitivity may be made by using the decibel scale of the instrument. Indication is on a DC milliammeter with a suitable rectifier for AC operation and other circuitry to make possible the direct reading feature. This meter is used in depot testing.

RELATIONSHIP TO OTHER EQUIPMENT:

This meter is similar to TS-585/U and TS-585A/U, but is not interchangeable because commercial parts have been replaced by JAN approved parts.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The meter terminates a circuit with a variable load impedance

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-587851		3F3323
PROCUREM'T INFO.:	Army Spec. 71-3339		
PROCUREM'T COG.:	Army	DESIGN COG.:	Army, CSL
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.2

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

connected across the binding posts and indicates output power delivered into the load. The AC voltage terminated by the binding posts is introduced across the load resistor into the metering circuit. The load resistor absorbs most of the input-power signal, while the metering circuit measures voltage produced across the load by the input power. The metering circuit consists of a meter multiplier, a network of resistors, a calibrating rheostat, and the meter which is calibrated in terms of power delivered to the load.

Power Supply: None.

Frequency Range: 30 to 10,000 cycles per second.

Power Ranges:	Milliwatts	Decibels Below One Milliwatt
	0.1 to 5	-10 to +7
	1 to 50	0 to +17
	10 to 500	+10 to +27
	100 to 5000	+20 to +37

Input Impedances: 2.5, 3, 4, 5, 6, 8, 10, 12.5, 15, 20, 25, 30, 40, 50, 60, 80, 100, 125, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000, 8000, 10,000, 12,500, 15,000, and 20,000 ohms.

Accuracies: Power: ±10% (at 11 decibel position).
Impedance: ±5%.

Temperature Range: 0° C. to +45° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Reiner Electronics Company, Inc., 152 West 25th Street, New York 1, New York.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TM 11-5017 and C1 (Instruction Book).

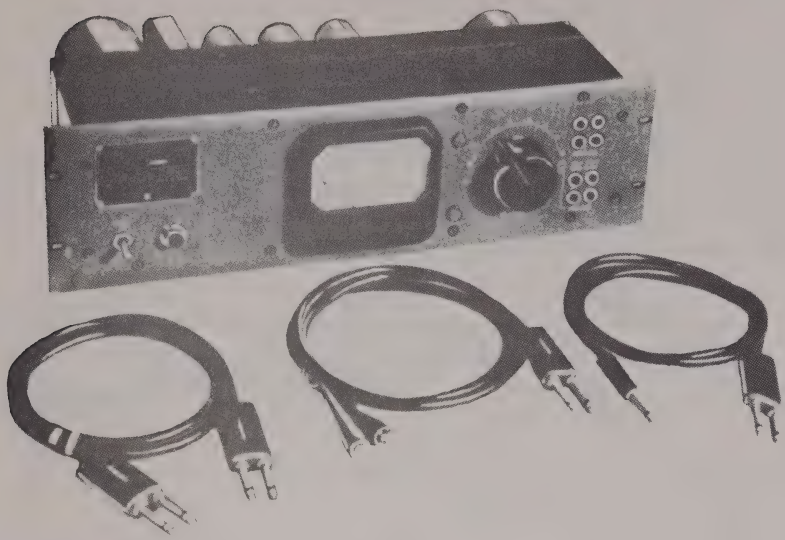
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Output Meter TS-585B/U	Aluminum	7CAC-587851 3F3323	8-1/2	10	5	13

AUDIO LEVEL TEST PANEL TS-629/U



FUNCTIONAL DESCRIPTION:

A portable, general purpose test panel designed to accurately measure audio volume levels in broadcasting, sound recording, telephone transmission, and allied fields where precise monitoring over the audio range is required.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The input circuit consists of a shielded transformer. This is followed by an audio-amplifier, and the indicating meter. A thermal relay shorts out the meter for 20 seconds after power is applied to the built-in regulated supply to avoid damage due to surge voltages.

Power Supply: 115 volts, ±10%, AC, 50 to 60 cycles per second, single phase.

Frequency Range: 30 to 15,000 cycles per second.

Audio Level Indicating Range:

As a bridging type instrument: -20 to +20 decibels, with a total range including meter scale of -40 to +23 decibels.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-801318-458	F16-Q-304804-200	
PROCUREM'T INFO.:	Spec. MIL-A-17045(Ships) dated 21 February 1952		
PROCUREM'T COG.:	Navy	DESIGN COG.: Navy, BuShips	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.2	
	- Electronics Test Equipment -		TS-629/U

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ELECTROMECHANICAL DESCRIPTION: (Continued)

As a terminating type instrument: -40 to +20 decibels, with a total range including meter scale of -60 to +23 decibels.

Meter Scale: -20 to +3 dbm.

Reference Level: 0 VU (1 milliwatt into 600 ohms).

Input Impedance: Terminating Connection: 600 ohms.
Bridging Connection: 12,500 ohms.

Frequency Response: Flat from 200 to 9000 cycles per second.
±0.5 decibels from 30 to 15,000 cycles per second.

Accuracy: Overall: ±5%. From -15 to +10 decibels and from 200 to 10,000 cycles per second: ±1.0%.

Temperature Range: -15° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Daven Company, Newark 4, New Jersey; Navy Contract No. NObsr-30166, dated 26 June 1946; Approximate Cost per Unit, $200.00, including spares.

TUBE COMPLEMENT:

1 JAN-6AG7, 1 JAN-6X5, 1 JAN-6C20, 1 JAN-OD3/VR-150.

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91072 (Instruction Book).

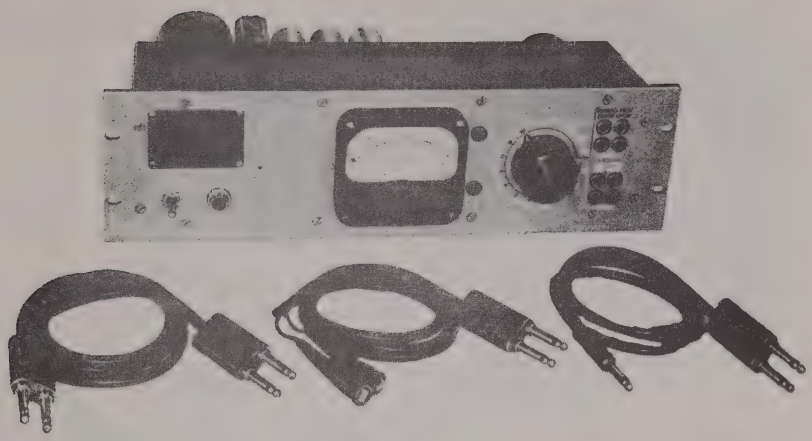
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Audio Level Test Panel TS-629/U, Accessories and Spares (Shelf Package)	2.5	12	22-1/2	16	36

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Audio Level Test Panel TS-629/U	Metal	7CAC-801318-458 F16-Q-304804-200	5-1/4	19	11	20
3	Cable			48 long each			
1	Set of Spares		F16-Q-304804-300	4	21	15	12

AUDIO LEVEL TEST PANEL TS-629A/U



FUNCTIONAL DESCRIPTION:

A portable general purpose test panel designed to accurately measure audio volume levels in broadcasting, sound recording, telephone transmission, and allied fields where precise monitoring over the audio range is required.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The input circuit consists of a shielded transformer. This is followed by an audio-amplifier, and the indicating meter. A thermal relay shorts out the meter for 20 seconds after power is applied to the built-in regulated supply to avoid damage due to surge voltages.

Power Supply: 115 volts ±10%, AC, 50 to 60 cycles per second, single-phase, 15 watts.

Frequency Range: 30 to 15,000 cycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-801317-295		
PROCUREM'T INFO.:	Spec. MIL-A-17045 (Ships) dated 21 February 1952		
PROCUREM'T COG.:	USN	DESIGN COG.:	USN, BuShips
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.2
- Electronics Test Equipment -			TS-629A/U

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Audio Level Indicating Range:

As a bridging type instrument: -20 to +20 decibels, with a total range including meter scale of -40 to +23 decibels.

As a terminating type instrument: -40 to +20 decibels, with a total range including meter scale of -60 to +23 decibels.

Meter Scale: -20 to +3 dbm.

Reference Level: 0 VU (1 milliwatt into 600 ohms).

Input Impedance: Terminating Connection: 600 ohms.
Bridging Connection: 12,500 ohms.

Frequency Response: ±0.1 decibel from 200 to 10,000 cycles per second.
±0.5 decibel from 30 to 15,000 cycles per second.

Accuracy: Overall: ±5%.
From -15 to +10 decibels and from 200 to 10,000 cycles per second: ±1%.

Temperature Range: -15° C. (+5° F.) to +55° C. (+131° F.).

Humidity Range: Up to 90%.

MANUFACTURERS' OR CONTRACTORS' DATA:

Reiner Electronics Company, 152 West 25th Street, New York, New York; USN Contract No. NObsr-57509, dated 12 June 1952.

TUBE COMPLEMENT:

1 JAN-6AG7, 1 JAN-6X5GT, 1 JAN-OD3/VR-150.

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91900 (Instruction Book).
TO 33A1-10-29-1 (Instruction Book).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Audio Level Test Panel TS-629A/U	2.5	12	22-1/2	16	36

GYRO POWER CONSUMPTION CHECKER
(GYRO POWER CONSUMPTION FIXTURE)
Part No. T-101070
(Sperry Gyroscope Company)

FUNCTIONAL DESCRIPTION:

A portable unit which is used to check the power consumption of the various gyros in the A-1 Computer. With this instrument it is possible to check the voltage and current readings for each of the phases in a three-phase gyro, including starting and running current.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Connection is made with the power source by means of an AC power input cable and with the computer under test by the gyro connection cable. Capacitors in the checker are used to correct the power factor of each phase to unity. By placing the selector switch, which is located on the front panel, in the desired positions the voltage and current are read for each phase during "starting" and "running" periods of the gyro. Readings are indicated on the voltmeter, ammeter, and milliammeter located on the front panel.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-291681		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.2	
	- Electronics Test Equipment - Sperry Part No. T-101070		

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

GYRO POWER CONSUMPTION CHECKER
(GYRO POWER CONSUMPTION FIXTURE)
Part No. T-101070
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: 115 volts, AC, 400 cycles per second, three-phase.
Voltage Measuring Range: 0 to 150 volts, AC.
Current Measuring Range: 0 to 3 amperes, AC.
0 to 100 milliamperes, AC.

MANUFACTURERS' OR CONTRACTORS' DATA:
Sperry Gyroscope Company, Great Neck, Long Island, New York.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
TO 33D5-7-2-1 (Operation and Service Instructions).
TO 33D5-7-2-4 (Parts Breakdown).

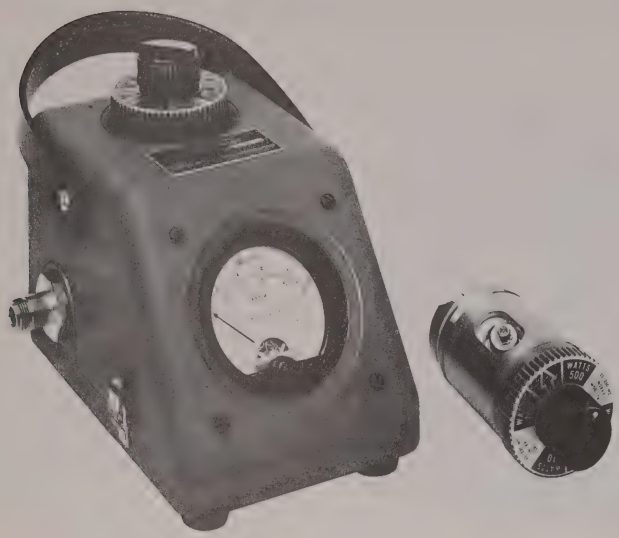
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Gyro Power Consumption Checker Sperry Part No. T-101070	Aluminum	7CAC-291681	9	16-3/4	9	10

14.3 RF POWER MEASURING EQUIPMENT



FUNCTIONAL DESCRIPTION:

A portable, general purpose equipment designed for intermittent or continuous measurement of radio frequency power of radars or other pulsed systems. Selector switches enable the meter to read directly in terms of incident radio frequency power or reflected radio frequency power. In addition, the instrument may also be used to match antennas or loads to transmitters or other power sources. The meter has a linear scale calibrated in watts.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-96 is similar to Bi-Directional Power Monitor Sierra 164 Plug-in elements providing power and frequency range of measurement are required but not supplied.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The indicator is a microammeter shock mounted in a die-cast case. The plug-in element, which fits into a receptacle in the top panel

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Navy	
F.L.I.N.:		FUNCTIONAL CLASS. NO.: 14.3	
- Electronics Test Equipment -			AN/URM-96

ELECTROMECHANICAL DESCRIPTION: (Continued)

of the instrument, is suspended in a power dissipating coolant. The plug-in element is comprised of a bank of non-inductive resistors and a crystal detector.

Power Supply: None.

Insertion VSWR: Less than 1.08 except on 1 watt range; less than 1.15 on 1 watt range.

Meter Calibration: 0 to 10 and 0 to 50 watts.

Accuracy: ±5% for full scale deflection.

Impedance: 50 ohms.

Connectors: Two Type N; female on left side, male on right.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sierra Electronic Corporation, 3885 Bohannon Drive, Menlo Park, California.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Bi-Directional Power Monitor AN/URM-96 Including:						7-1/2
1	Plug-In Unit						

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Bi-Directional Power Monitor, AN/URM-96					

RADIO TEST SET AN/ARM-7
(TEST SET, RADIO, AN/ARM-7)

FUNCTIONAL DESCRIPTION:

A portable, general purpose set, used to load the transmitter of a radio set and to measure its radio frequency power output. The RF output connection of the transmitter is terminated, and the power output is absorbed after being measured by a thermoammeter incorporated in the equipment. Terminals are provided for RF voltage sampling and for modulation checking. An external means of detection must be provided for modulation checking.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: A terminating resistive load is connected in series with the thermoammeter. Modulation is checked through an attenuating capacitor.

Power Supply: None required.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Tentative Standard		
STOCK NOS.	7CAC-801319-25515		
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, C&N	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			AN/ARM-7

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RADIO TEST SET AN/ARM-7
(TEST SET, RADIO, AN/ARM-7)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Frequency Range: 2 to 24 megacycles per second.
Type of Reception: Continuous Wave, Amplitude Modulation.
Power Dissipation Rating: 150 watts, average.
Input Impedance: 50 ohms, resistive.
Attenuating Capacitance for Modulation Checking: 35 micromicrofarads.
Accuracy: ±10%.

MANUFACTURERS' OR CONTRACTORS' DATA:
Radio Corporation of America, Camden, New Jersey; USAF Contract AF 33(600) 24390 dated 25 April 1953; RCA drawing C-748613.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
TO 16-30 ARM7-1 (Operation and Service Instructions).
TO 16-30 ARM7-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Test Set AN/ARM-7 Including:	Aluminum	7CAC-801319-25515				11.5 (Complete)
1	Electrical Dummy Load DA-72/U	Metal		8-5/32	8-1/2	8-1/16	6.0
1	RF Cable Assembly CG-567/U			16 long			
1	RF Cable Assembly CG-690/U			48 long			
1	Case CY-1438/ARM-7			9	9-5/32	9	4.5

SUMMATION BRIDGE AN/URM-19(XW)

FUNCTIONAL DESCRIPTION:

A portable, general purpose, field type, ruggedized wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Alternate Standard		
STOCK NOS.	7CAC-138780		
PROCUREM'T INFO.: Exhibit WLENG-1081A			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, Rome	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			AN/URM-19(XW)

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

with an equal amount of DC power. This summation type circuit allows the radio frequency power to be read directly.

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1600 cycles per second.

Frequency Range: 20 to 1000 megacycles per second.

Power Input Range: 100 microwatts to 100 milliwatts (100 microwatts to 1 milliwatt without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: Less than 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40°C. to +55°C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Polytechnic Research and Development Company, Inc., Brooklyn, New York; USAF Development Contract No. W 28-099-ac-462.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

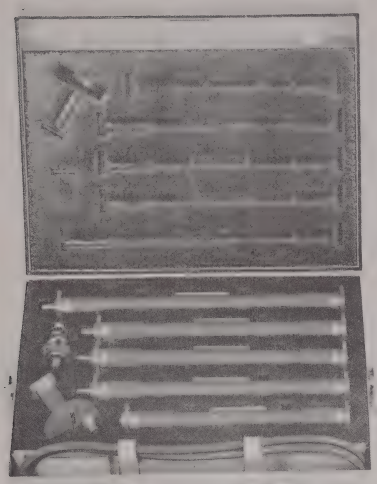
SHIPPING DATA:

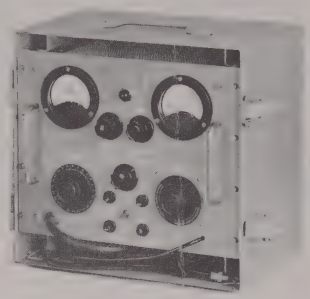
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Bridge Summation AN/URM-19(XW) Including:		7CAC-138780				
1	Summation Bridge TS-731/URM						
1	Transit Case						
1	RF Head						
1	RF Adapter UG-402( )/U			3-1/4	1-3/8	1-3/8	0.4
5	Spare Bolometer Element						
1	RF Cord CG-92B/U			72 long			1.0
1	3-decibel Attenuator CN-( )/U						
1	6-decibel Attenuator CN-( )/U						
1	10-decibel Attenuator CN-( )/U						
1	20-decibel Attenuator CN-( )/U						

SUMMATION BRIDGE AN/URM-20





FUNCTIONAL DESCRIPTION:

A portable, general purpose, field type, ruggedized wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power with an equal amount of DC power. This summation type circuit allows the radio

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Alternate Standard		
STOCK NOS.	7CAC-138781		
PROCUREM'T INFO.:	Exhibit ENG-362		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, Rome
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14. 3. 1
- Electronics Test Equipment -			AN/URM-20

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

frequency power to be read directly.

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1600 cycles per second.

Frequency Range: 1000 to 4000 megacycles per second.

Power Input Range: 100 microwatts to 100 milliwatts (100 microwatts to 1 milliwatt without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: Less than 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bruno-New York Industries, 460 West 34th Street, New York 1, New York; USAF Production Contract No. AF 33(038)30604, Supplement No. 7, dated July 1953; Approximate Cost per Unit, $850.00.

TUBE COMPLEMENT:

1 JAN-5Y3GT, 1 JAN-6AS7G, 1 JAN-6AU6, 2 JAN-5651.

REFERENCE DATA AND LITERATURE:

TO 16-30URM20-1 (Operating Instructions).
TO 16-30URM20-2 (Service Instructions).
TO 16-30URM20-3 (Overhaul Instructions).
TO 16-30URM20-4 (Illustrated Parts Catalog).

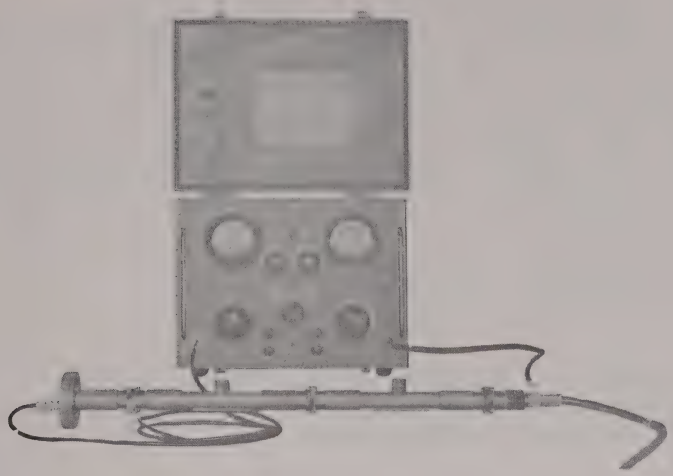
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge AN/URM-20 Including:		7CAC-138781				
1	Summation Bridge TS-731/URM			13	14	11	15
1	Transit Case			16	13	5-1/2	12
1	RF Head DT-75/U			4	3 dia.		
1	RF Adapter UG-402/U			3-1/4	1 dia.		
5	Spare Bolometer Element						
1	RF Cord CG-92B/U			72 long			
1	Power Measuring Kit MX-1306/URM-20			16	14	5-1/2	12
1	3-decibel Attenuator CN-168A/U			14-1/4 long	1-3/16 dia.		
1	6-decibel Attenuator CN-169A/U			14-1/4 long	1-3/16 dia.		
1	10-decibel Attenuator CN-110A/U			14-1/4 long	1-3/16 dia.		
1	20-decibel Attenuator CN-111A/U			27 long	1-3/16 dia.		

SUMMATION BRIDGE AN/URM-21(XW)



FUNCTIONAL DESCRIPTION:

A portable, general purpose, field type, ruggedized wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Development		
STOCK NOS.	7CAC-138795		
PROCUREM'T INFO.:	Exhibit WLENG-1081A		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, Rome
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.3.1

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

with an equal amount of DC power. This summation type circuit allows the radio frequency power to be read directly.

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1600 cycles per second.

Frequency Range: 4000 to 10,000 megacycles per second.

Power Input Range: 100 microwatts to 100 milliwatts (100 microwatts to 1 milliwatt without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: Less than 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Polytechnic Research and Development Company, Inc., Brooklyn, New York; USAF Development Contract W 28-099-ac-462.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge AN/URM-21(XW) Including:		7CAC-138795				
1	Summation Bridge TS-731/URM						

(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Transit Case						
1	RF Head						
1	RF Adapter UG-402( )/U						
5	Spare Bolometer Element						
1	RF Cord CG-92B/U						
1	3-decibel Attenuator CN-( )/U						
1	6-decibel Attenuator CN-( )/U						
1	10-decibel Attenuator CN-( )/U						
1	20-decibel Attenuator CN-( )/U						

SUMMATION BRIDGE AN/URM-22

FUNCTIONAL DESCRIPTION:

A portable, field type, ruggedized, general purpose wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power with an equal amount of DC power. This summation type circuit allows the radio frequency power to be read directly.

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1000 cycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Alternate Standard		
STOCK NOS.	7CAC-138785		
PROCUREM'T INFO.:	Exhibit WLENG 1081A		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, Rome
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.3.1
- Electronics Test Equipment -			AN/URM-22

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Frequency Range: 20 to 1000 megacycles per second.

Power Input Range: 5 milliwatts to 5 watts (5 milliwatts to 50 milliwatts without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Polytechnic Research and Development Company, Inc., Brooklyn, New York; USAF Development Contract No. W 28-099-ac-462.

TUBE COMPLEMENT:

1 JAN-5Y3GT, 1 JAN-6AS7G, 1 JAN-6AU6, 2 JAN-5651.

REFERENCE DATA AND LITERATURE:

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

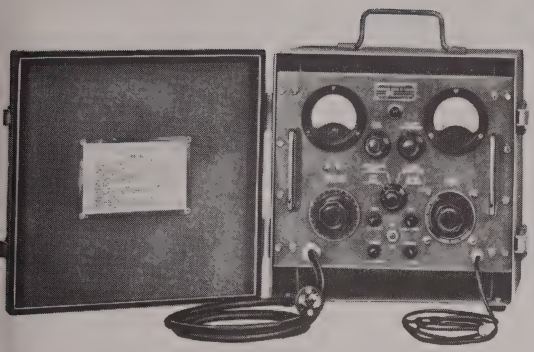
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge AN/URM-22 Including:		7CAC-138785				
1	Summation Bridge TS-730/URM	Steel wrinkle finish		11-13/16	13-1/2	11-1/8	28

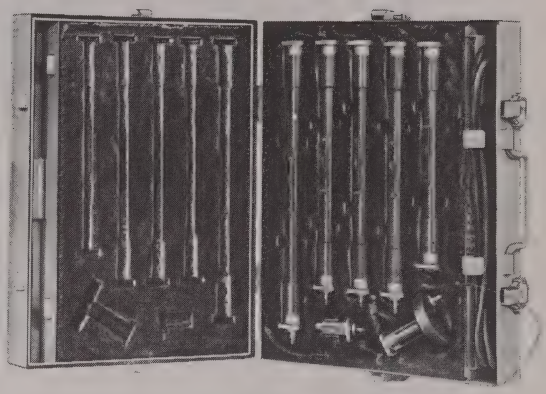
(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Transit Case for MX-1309(XW-1)/ URM-22 Power Measuring Kit	Steel wrin-kle finish		11-11/16	6-5/16	16-1/4	9
1	RF Head DT-74(XW-2)/U	Silver plated brass		4-5/32	3 dia.		1.64
1	RF Adapter UG-402/U	Silver plated brass		3-1/4	1-3/8	1-3/8	0.4
5	Spare Bolometer Element				2 dia.		
1	RF Cord CG-92B/U			75 long			1
1	3-decibel Attenuator CN-173(XW-2)/U			10-3/64	1-3/4	1-3/8	1.05
1	6-decibel Attenuator CN-174(XW-2)/U			10-3/64	1-3/4	1-3/8	1.05
1	10-decibel Attenuator CN-120 (XW-2)/U			10-3/64	1-3/4	1-3/8	1.05
1	20-decibel Attenuator CN-121 (XW-2)/U			7-35/64	2	2	1.36

SUMMATION BRIDGE AN/URM-23





FUNCTIONAL DESCRIPTION:

A portable, field type, ruggedized, general purpose wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power with an equal amount of DC power. This summation type circuit allows the radio frequency power to be read directly.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Alternate Standard		
STOCK NOS.	7CAC-138790		
PROCUREM'T INFO.:	Exhibit MCREE-941		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, Rome
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14. 3. 1

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1600 cycles per second.

Frequency Range: 1000 to 4000 megacycles per second.

Power Input Range: 5 milliwatts to 5 watts (5 milliwatts to 50 milliwatts without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bruno-New York Industries Corporation, 460 West 34th Street, New York 1, New York; USAF Production Contract No. AF 33(038)30604, dated 6 June 1952; Approximate Cost per Unit, $862.67.

TUBE COMPLEMENT:

1 JAN-5Y3GT, 1 JAN-6AS7G, 1 JAN-6AU6, 2 JAN-5651.

REFERENCE DATA AND LITERATURE:

TO 16-30URM23-1 (Operation Instructions).
TO 16-30URM23-2 (Service Instructions).
TO 16-30URM23-3 (Overhaul Instructions).
TO 16-30URM23-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge AN/URM-23 Including:		7CAC-138790				

(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge TS-730/URM	Aluminum		13	14	11	15
1	Power Measuring Kit MX-1309/URM-23	Aluminum					
1	RF Head			4	3 dia.		
1	RF Adapter UG-402/U		8850-109315	3-1/4	1 dia.		
1	Transit Case CY-1405/URM-23			16	20	5-1/2	12
5	Spare Bolometer Element						
1	RF Cord CG-92B/U		7CAC-170265-6	72 long	1-3/16 dia.		
1	3-decibel Attenuator CN-168/U			14-1/4 long	1-3/16 dia.		
1	6-decibel Attenuator CN-169/U			14-1/4 long	1-3/16 dia.		
1	10-decibel Attenuator CN-110/U			14-1/4 long	1-3/16 dia.		
1	20-decibel Attenuator CN-111/U			27 long	1-3/16 dia.		
1	RF Bolometer Mount (with element) DT-76/U						
12	Coupling Screw AN501-10-8						

SUMMATION BRIDGE AN/URM-24

FUNCTIONAL DESCRIPTION:

A portable, field type, ruggedized, general purpose wattmeter used to measure radio frequency power output of radio, radar, and navigation equipments.

RELATIONSHIP TO OTHER EQUIPMENT:

The AN/URM-19 through AN/URM-24 are similar except for their individual power and frequency ranges.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Employs a direct-reading summation type circuit in which a bolometer acts as one arm of a DC Wheatstone bridge, while at the same time providing the correct resistivity termination for radio frequency power entering the wattmeter. The resistance of the bolometer is controlled by varying the direct current through the bridge, to enable a comparison of radio frequency power with an equal amount of DC power. This summation type circuit allows the radio

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-138775		
PROCUREM'T INFO.:	Exhibit MCREE-949		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, Rome
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.3.1

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

frequency power to be read directly.

Power Supply: 115 volts ±10%, AC, single phase, 50 to 1600 cycles per second.

Frequency Range: 4000 to 10,000 megacycles per second.

Power Input Range: 5 milliwatts to 5 watts (5 milliwatts to 50 milliwatts without attenuator) for continuous wave measurements. In pulse modulated power measurements, the peaks cannot exceed 2000 times the rated average power. The maximum average power must be reduced for low repetition rates and high peak power according to the derating graph supplied with the set.

Input Impedance: 50 ohms.

Voltage Standing Wave Ratio: 1.3.

Accuracy: ±15% of power being measured.

Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bruno-New York Industries Corporation, 460 West 34th Street, New York 1, New York; USAF Production Contract No. AF 33(038)16249, dated 28 March 1952.

TUBE COMPLEMENT:

1 JAN-5Y3GT, 1 JAN-6AS7G, 1 JAN-6AU6, 2 JAN-5651.

REFERENCE DATA AND LITERATURE:

TO 16-30URM24-1 (Operating Instructions).
TO 16-30URM24-2 (Service Instructions).
TO 16-30URM24-3 (Overhaul Instructions).
TO 16-30URM24-4 (Parts Breakdown).

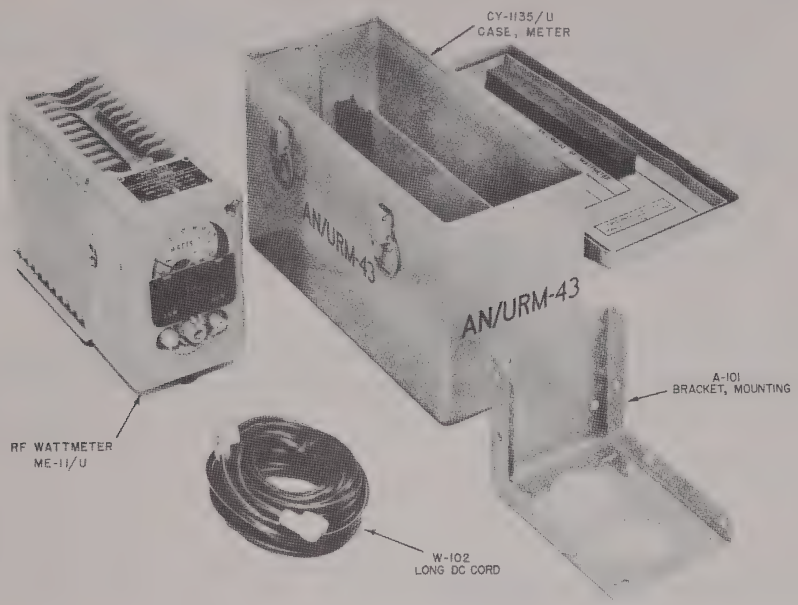
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Summation Bridge AN/URM-24 Including:		7CAC-138775				
1	Summation Bridge TS-730/URM			13	14	11	15
1	Transit Case CY-1412/URM-24			18	8	6	5
1	RF Head DT-73/U			3		2 dia.	
1	RF Adapter UG-402/U			3-1/4		1 dia.	
5	Spare Bolometer Element DT-155/U						
1	RF Cord CG-92B/U			72 long			
2	3-decibel Attenuator CN-264/U			8-1/4 long		3/4 dia.	
2	7-decibel Attenuator CN-265/U			8-1/4 long		3/4 dia.	

RF WATTMETER AN/URM-43
(WATTMETER, AN/URM-43)



FUNCTIONAL DESCRIPTION:

A portable, general purpose, radio frequency absorption type wattmeter used to measure output power and to facilitate tuning of transmitters. It may be used as a dummy load of 51.5 ohms up to 60 watts, as a modulation monitor, as an accurate radio frequency resistance, and for loss measurements on transmission lines. Power indications are read directly on a double scale DC microammeter in RF watts.

RELATIONSHIP TO OTHER EQUIPMENT:

Similar to Bird Electronic Corporation, Termaline RF Wattmeter Model 61.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Circuit basically consists of a 50-ohm coaxial load resistor and a dual range crystal rectifier type voltmeter capacitively coupled to the load resistor.

Power Supply: None.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-979519	17-M-36513-6176	
PROCUREM'T INFO.: Spec. MIL-R-15331B (Ships) dated 11 December 1951			
PROCUREM'T COG.: Navy		DESIGN COG.: Navy, BuShips	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			AN/URM-43

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RF WATTMETER AN/URM-43
(WATTMETER, AN/URM-43)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Frequency Range: Wattmeter, 100 to 500 megacycles per second direct reading, 30 to 600 megacycles per second with corrections from chart. Dummy Load, 0 to approximately 3000 megacycles per second.

Power Range: 0 to 60 watts in two ranges, 0 to 15 and 0 to 60 watts.

Type of Reception: Continuous Wave, Amplitude Modulation, Frequency Modulation, or Television Type Signals.

Voltage Standing Wave Ratio: Less than 1.1.

Impedance: 51.5 ohms.

Accuracy: ±5% of full scale reading.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 East 38th Street, Cleveland, Ohio; Contract Nos. NObsr-52121, dated 13 December 1950, and NObsr-52667, dated 20 June 1951.

TUBE COMPLEMENT:

1 JAN-1N21B (Crystal Rectifier).

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91551 (Instruction Book).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	RF Wattmeter AN/URM-43 (Shelf Package)	0.41	8-1/4	6-3/4	12-1/2	14.2

RF WATTMETER AN/URM-43
(WATTMETER, AN/URM-43)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	RF Wattmeter AN/URM-43 Including:		7CAC-979519 17-M-36513-6176				
1	RF Wattmeter ME-11/U	Aluminum	7CAC-979564 3F25011	6-1/2	4-3/4	9-1/2	7.35
1	Meter Case CY-1135/U	Aluminum		7-5/8	6-1/4	12-1/4	3.5
1	Bracket	Steel		4-1/2	4-3/8	5-3/4	0.9
1	DC Cable			300 long			0.75
2	Instruction Book NavShips 91551			11-1/2	1/4	9	0.6

WATTMETER AN/URM-43A
(RF WATTMETER AN/URM-43A)

FUNCTIONAL DESCRIPTION:

A portable general purpose radio frequency absorption type wattmeter used to measure output power and to facilitate tuning of transmitters. It may be used as a dummy load of 51.5 ohms up to 60 watts, as a modulation monitor, as an accurate radio frequency resistance, and for loss measurements on transmission lines. Power indications are read directly on a double scale DC microammeter in RF watts.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The circuit consists of a 50-ohm coaxial load resistor and a dual range crystal rectifier type voltmeter capacitively coupled to the load resistor. The dummy load-voltmeter housing is oil filled and surrounded by a finned radiator structure. A neoprene expansion diaphragm, which prevents pressure rise with temperature, is mounted on the front of the housing.

Power Supply: None.

Frequency Range: Wattmeter, 30 to 600 megacycles per second. Dummy load, 0 to above 900 megacycles per second.

Power Range: 2 to 60 watts in two ranges, 0 to 15 and 0 to 60 watts.

Type of Reception: Continuous wave, amplitude modulation, frequency modulation, or television type signals.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-979548	F16-Q-123759-100	
PROCUREM'T INFO.:	Spec. MIL-R-15331B, dated 11 December 1951		
PROCUREM'T COG.:	USN	DESIGN COG.:	USN, BuShips
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.3.1
- Electronics Test Equipment -			AN/URM-43A

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

WATTMETER AN/URM-43A
(RF WATTMETER AN/URM-43A)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Voltage Standing Wave Ratio: Less than 1.1.
Output Impedance: 51.5 ohms.
Accuracy: ±2% of full scale reading.
Temperature Range: -40°C. (-40°F.) to +55°C. (+131°F.).

MANUFACTURERS' OR CONTRACTORS' DATA:
Electro Impulse Laboratory, 62 White Street, Red Bank, New Jersey; USN Contract No. NObsr-57180, dated 18 November 1952.

TUBE COMPLEMENT:
1 JAN-1N82 (Crystal Rectifier).

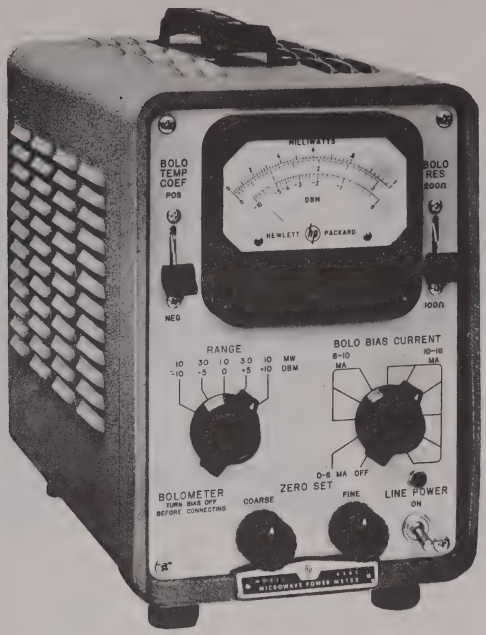
REFERENCE DATA AND LITERATURE:
NAVSHIPS 91842 (Instruction Book).
TO 33A1-7-9-11 (Instruction Book).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter AN/URM-43A (Shelf Package)	0.45	10	10-1/2	7-1/2	12.5

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter AN/URM-43A		7CAC-979548 F16-Q-123759-100				
	Including:						
1	RF Wattmeter ME-11A/U	Aluminum		6-1/2	4-1/2	8-7/10	6.4
1	Meter Case CY-1135A/U	Aluminum		7-2/10	5-7/10	9-2/10	2.15
1	Bracket	Steel		3-1/2	4-6/10	5-1/2	0.6
2	Instruction Book			7-1/2	5-1/2	1/4	0.25



FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure radio frequency power levels. The instrument may be used for testing or calibrating signal generators, attenuators, traveling-wave tubes, coaxial cable or waveguide systems. Test results are indicated directly on the panel meter.

RELATIONSHIP TO OTHER EQUIPMENT:

Similar to Hewlett-Packard Microwave Power Meter Model 430C.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The power meter consists of two major components, an indicator unit and a bolometer element. The indicator functions on the audio substitution principle. The bolometer is the power sensitive element used as one arm of an audio bridge. The bridge is initially balanced by direct current bias and audio power fed to the bolometer element from a 10.8 kilocycle per second oscillator. When radio frequency power is received by the bolometer the bridge

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Substitute Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.: 6625-560-6084		FUNCTIONAL CLASS. NO.: 14.3.1	

ELECTROMECHANICAL DESCRIPTION: (Continued)

becomes unbalanced. Due to feedback, the audio power fed to the bridge is decreased to rebalance the bridge. The amount of decrease of the audio power is a direct indication of the radio frequency power applied to the bolometer. The change of audio power is indicated by a vacuum tube voltmeter circuit. The power meter is provided with circuits so that adjustment may be made for either positive or negative temperature coefficient bolometers and to accommodate either 100 or 200 ohm resistances. The power meter may be used at any frequency for which a bolometer mount is available. A type BNC coaxial connector is provided for connection to a bolometer mount.

Power Supply: 115 or 230 volts ±10%, AC, 50 to 1000 cycles per second, 90 watts.

Power Range: 0 to 0.1, 0.3, 1.0, 3.0 and 10 milliwatts; -20 to +10 decibels referred to 1 milliwatt.

Accuracy: ±5% of full scale reading.

Direct Current Bias: 0 to 16 milliamps.

MANUFACTURERS' OR CONTRACTORS' DATA:

Hewlett-Packard Company, 275 Page Mill Road, Palo Alto, California; Contract No. N383S-18126A; Approximate Cost per Unit, $250.00.

TUBE COMPLEMENT:

1 5Y3, 2 6AU5GT, 1 6AV6, 3 6CB6, 2 12AX7, 1 5651.

REFERENCE DATA AND LITERATURE:

Manufacturer's Operating and Service Instructions.

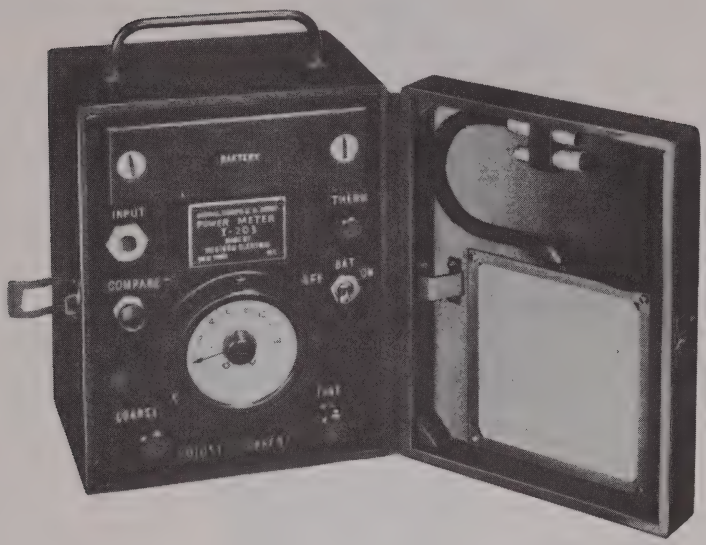
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter AN/URM-98	Metal		11-1/2	7-3/8	14	14

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter AN/URM-98					32

POWER METER I-203-A
(WATTMETER, I-203-A)



FUNCTIONAL DESCRIPTION:

A portable, specialized power-measuring device used for calibrating the power output of signal generators used in radar testing and for making measurements of ultra-high frequency power in other radar testing operations. Power readings are obtained from the current indication of the milliammeter by calculation or by reference to the nomograph included in the maintenance instructions. CW power determinations are made by consulting a calibrated chart, and pulse power must be calculated mathematically by formula. All switches and controls along with the milliammeter are mounted on the front panel.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: A thermistor is employed to compare the heating effect of the unknown radio frequency power with the heating effect of the known DC power which is supplied and measured within the set. The thermistor must be set to 100 ohms by first adjusting the DC current along, and second with the radio frequency power applied; readings of the milliammeter are taken in each case. The

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-979563-7	N16-T-1835-5	3F3770-203A
PROCUREM'T INFO.:	WE Co Spec. No. X-61706A		
PROCUREM'T COG.:	USAF	DESIGN COG.: USAF, Arm	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			I-203-A

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

difference in DC power, as calculated from the current and resistance ($100I^2$), is then equal to radio frequency power.

Power Supply: 3 volts supplied by 2 Battery, BA-30 (1.5 volts).
Frequency Range: 2700 to 3400 megacycles per second.
Power Input Range: 0.5 to 12 milliwatts (-3 to +11 dbm).
Type of Input: Continuous Wave, Pulsed.
Input Impedance: 72 ohms.
Ambient Temperature Limits: 0° C. to 46° C.
Accuracy: ±0.25 decibel.

MANUFACTURERS' OR CONTRACTORS' DATA:

Western Electric Company, 195 Broadway, New York 7, New York; Contract No. ESX-803948; Contract No. SC-1122-Phila-42, 18 November 1941; Approximate Cost per Unit, $191.00; Contract No. NXs-12760; Contract No. 239-42, 30 June 1942; Approximate Cost per Unit, $191.00; Contract No. 12162-43, 29 June 1943; Approximate Cost per Unit, $190.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 16-40I203-3 (Maintenance Instructions).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter I-203-A	Wood	7CAC-979563-7 N16-T-1835-5 3F3770-203A	9-3/4	7-1/16	6-3/8	7.5
1	Coaxial Cable KS-8086		3300-132335635 1F425-39.12	12 long			
1	Instruction Book						

RF WATTMETER ME-82/U

FUNCTIONAL DESCRIPTION:

A portable, general purpose radio frequency absorption type wattmeter used to measure the output power of oscillator circuits, transmitters and transmission lines under optimum load conditions. Power indications are read directly on a DC microammeter calibrated in watts of incident power.

RELATIONSHIP TO OTHER EQUIPMENT:

Similar to M.C. Jones RF Wattmeter Model 625.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument consists of a load resistor, a single directional coupler and an indicator. The resistive element of the load resistor is completely enclosed in a bath of insulating oil. Heat is radiated from the load by means of cooling vanes mounted around the outside of the resistor. An internal bellows provides for expansion and contraction of the insulating oil. The directional coupler contains a crystal to provide a DC output to the indicator circuit. The indicating meter is hermetically sealed.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.: Spec MIL-R-10612			
PROCUREM'T COG.: Army		DESIGN COG.: Army, SCSL	
F.L.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			ME-82/U

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: None.
Frequency Range: 50 to 1000 megacycles per second.
Power Range: 0 to 120 watts.
Impedance: 50 ohms.
Accuracy: ±5%.
Voltage Standing-Wave Ratio: 1.2, maximum.

MANUFACTURERS' OR CONTRACTORS' DATA:
M.C. Jones Electronics Company, Incorporated, Subsidiary of Bendix Aviation Corporation, 185 North Main Street, Bristol, Connecticut; Approximate Cost per Unit, $250.00.

TUBE COMPLEMENT:
None

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

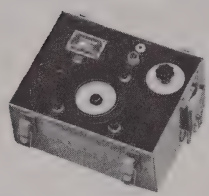
EQUIPMENT SUPPLIED:

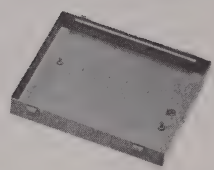
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	RF Wattmeter ME-82/U	metal		6	7-1/2	13-9/16	10-1/2

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	RF Wattmeter, ME-82/U					

POWER METER TS-36/AP





FUNCTIONAL DESCRIPTION:

A portable test equipment used to measure either continuous wave or pulse modulated power outputs of radio or radar transmitters. Consists of a power measuring head, a radio frequency attenuator and DC Thermistor Bridge circuit. Equipment is so arranged that fractions of a milliwatt of radio frequency power can be read directly on the meter. Meter deflections versus power level is linear.

RELATIONSHIP TO OTHER EQUIPMENT:

To be replaced by ME-27/AP.

ELECTROMECHANICAL DESCRIPTION:

Power Supply: 4 Batteries (BA-30) 1.5 volts each for upper temperature range and external 28-volt DC for lower temperature range. Current drain 0.22 amperes.

Power Range: 0.1 to 1000 milliwatts (-10 to +30 dbm) average power. On the basis of a 20 decibel antenna coupling loss, peak powers of 150 kilowatts maximum for a duty cycle ratio of 1/1500 and 50 kilowatts maximum for a duty cycle of 1/500 may be measured.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Limited Standard		
STOCK NOS.	7CAC-801319-2244		3FK4325-36
PROCUREM'T INFO.: USAF No. 371-5036			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, ARL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-36/AP

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Frequency Range: 8700-9500 megacycles per second.

Accuracy:

Absolute: ±1 decibel in the range 0.1 to 1.0 milliwatts and ±1.5 decibel in the range 1.0 to 1000 milliwatts. Frequency characteristic of the attenuator must be considered.

Relative: ±0.3 decibel from 0.1 to 1.0 milliwatts. ±0.8 decibel from 1.0 to 1000 milliwatts within 100 megacycle band.

Temperature Range: -40° C. to +50° C.

Input Impedance: Termination of 1-1/4" x 5/8" waveguide for TE_{01} mode, provided by power measuring head affording a maximum standing wave ratio of 1.41 on a balanced bridge basis and 1.55 on a direct reading basis.

MANUFACTURERS' OR CONTRACTORS' DATA:

Western Electric Company, New York, New York; Type No. X-61722; Order No. 11925-DAY-43, 22 June 1943; Approximate Cost per Unit, $413.10; Order No. 85-DAY-44, 30 November 1943; Approximate Cost per Unit, $467.00; Order No. 120-45-RA, 22 July 1944; Approximate Cost per Unit, $427.25; Order No. 768-DAY-45, 17 February 1945; Approximate Cost per Unit, $586.00; Order No. 2080-45-AR, 15 March 1945; Approximate Cost per Unit, $503.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 16-35TS36-3 (Maintenance Instructions).
TO 16-35TS36-2 (Operation Instructions).
TO 16-55-19 (Spare Parts List).

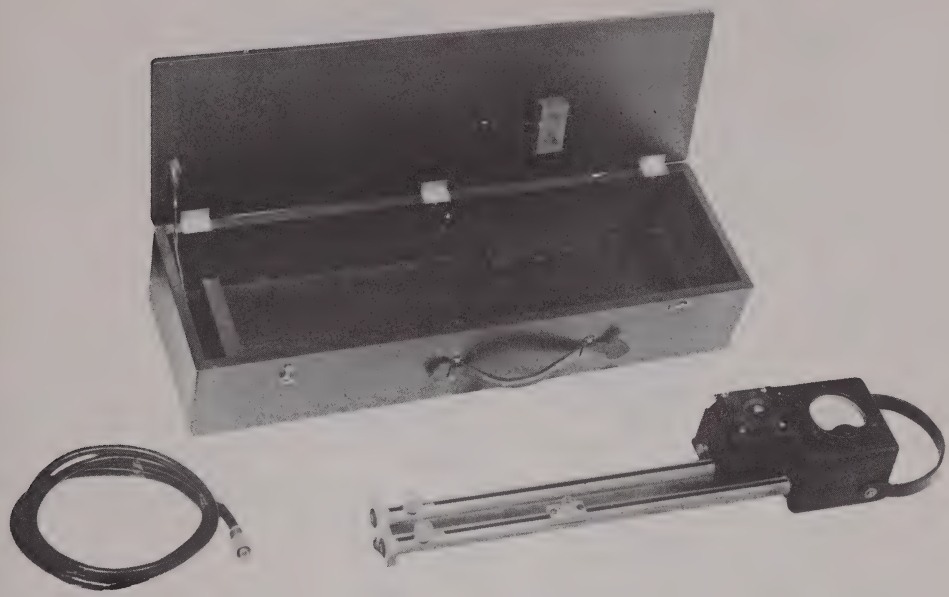
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Two each, Power Meter TS-36/AP with accessories	3.48	16.5	13.5	27	30

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches) H	W	D	Weight (Lbs.)
1	Power Meter TS-36/AP		7CAC-801319-2244 3FK4325-36	10	7-5/8	5-27/32	8
1	Case CY-45/AP	Wood	7CAC-176535 3F2529-45	11	11	13-1/4	2
1	Cord CG-60/AP		7CWX-BL431313-1 1F430-60.60	60 long			
1	Cord CG-61/AP		7CWX-BL485539 1F430-61.60	60 long			
1	Horn Antenna AT-39/AP		7CAC-201020515 2A203-39	3-3/8	3-1/8	3-5/8	0.5
1	Adapter MX-135/AP		7CAC-002910-85 2Z301-135	1-3/4	1-3/4	3/8	0.25
1	Cord CX-68/AP		7CAC-170264-435 3E6000-68-120	120 long			
1	Instruction Book AN16-35TS36-3		Class 30-A(9200) 3F4325-36/B1				
1	Wrench, Hex		6R57400	5/64			
1	Wrench, Hex L-shaped		6R55496				
1	Power Measuring Head		3F3901-35/P1				
						Total:	12.75

RADIO FREQUENCY WATTMETER TS-70/AP



FUNCTIONAL DESCRIPTION:

A portable, general purpose unit for use in depots for the measurement of the average power output of radio transmitters. A portion of the power output of the transmitter under test is coupled to the wattmeter. The power thus fed passes through a lamp and causes it to glow. The lumen output from this lamp activates a photo cell in series with a 0-200 microampere meter. Since the microammeter reading bears a definite known relationship to the transmitter output power, this reading is a valid average power output measurement. It is necessary, however, to refer to the appropriate curve on the conversion chart corresponding to the meter reading to obtain average power output in watts.

RELATIONSHIP TO OTHER EQUIPMENT:

To be replaced by TS-118/AP.

ELECTROMECHANICAL DESCRIPTION:

Power Supply: The power output of the transmitter under measurement is the only power required.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Limited Standard		
STOCK NOS.	7CAC-979563		3F4325-70
PROCUREM'T INFO.: USAF Spec. No. 271-5030			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, ARL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-70/AP

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Input Impedance: Adjustable.
Power Range: 2 to 30 watts.
Frequency Range: 200 to 750 megacycles per second.
Accuracy: ±10%.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Engineering Company, 1798 East 38th Street, Cleveland, Ohio; Order No. 160-45-RC, 21 October 1944, Approximate Cost per Unit, $160.00; Order No. 698-DAY-44, 28 February 1944, Approximate Cost per Unit, $150.00.

TUBE COMPLEMENT:

Bradley Type 31A (photo cell).

REFERENCE DATA AND LITERATURE:

TO 08-35TS70-2 (Maintenance Instructions).
TO 08-55-52 (Spare Parts List).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	4 each, Radio Frequency Wattmeter TS-70/AP with accessories. (Domestic Packed)	9.6	18.5	39	23	97

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Frequency Wattmeter, TS-70/AP	Wood	7CAC-979563 3F4325-70	5	23	4	10
1	Cord, CG-55/U (includes Cable RG-8/U and two R-F plugs UG-21/U)		7CAC-170265-345 1F430-55.60	60 long			0.9
1	Case CY-81/AP	Wood	3F2529-81	5-3/4	26-1/4	9-3/4	9
2	Lamps, Bird Engr. Type A		3300-292325507 2Z5881-2				
4	Lamps, Bird Engr. Type B No. 1827		3300-292325509 2Z5881-3				
1	Photo Cell Bradley Type 31A		3300-326132500 3F2591				

RADIO FREQUENCY WATTMETER TS-87/AP

FUNCTIONAL DESCRIPTION:

A self-contained, portable, test equipment for depot use to measure the average power output of radio transmitters.

The wattmeter provides an adjustable matching system for correctly coupling an incandescent lamp load to the output of the transmitter under test and a photocell-microammeter (0-200 microamperes) circuit for determining the amount of power being dissipated in the lamp by measuring a portion of its lumen output. An individually calibrated chart converts the microammeter readings into watts of power output.

RELATIONSHIP TO OTHER EQUIPMENT:

Satisfactory substitute for TS-118/AP for measuring low power transmission.

Used with radar sets such as AN/APT-1.

ELECTROMECHANICAL DESCRIPTION:

Power Supply: The output power of the transmitter under measurement is the only power required.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Limited Standard		
STOCK NOS.	7CAC-801319-2573		3F4325-87
PROCUREM'T INFO.: USAF Spec. No. 271-5023			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, ARL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14. 3. 1	
- Electronics Test Equipment -			TS-87/AP

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Input Impedance: Adjustable.
Power Range: 2 to 30 watts.
Frequency Range: 85 to 200 megacycles per second.
Accuracy: ±10%.
Sensitivity: 2 watts minimum input.

MANUFACTURERS' OR CONTRACTORS' DATA:

W. W. Boes Company, Dayton, Ohio; Order No. 654-DAY-44, 20 January 1944; Order No. 1473-DAY-44, 26 September 1944; Approximate Cost per Unit, $215.00.

TUBE COMPLEMENT:

Weston type 594RR or Bradley 3-1A photocell.

REFERENCE DATA AND LITERATURE:

AN-08-35TS87-2 (Maintenance Instructions).
TO 16-55-53 (Spare Parts List).

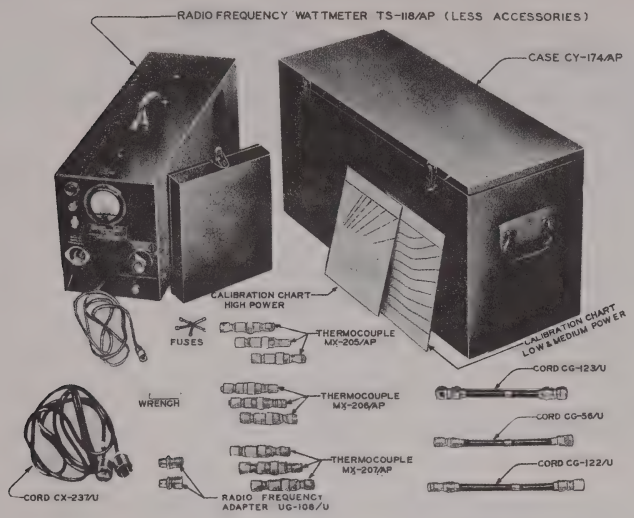
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Radio Frequency Meter, TS-87/AP, with accessories (Nailed Wooden Box)	.77	11	11	11	20

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Frequency Wattmeter TS-87/AP Including:	Metal	7CAC-801319-2573 3F4325-87	7.5	7.5	6	9.19
1	Cord CG-55/U		7CAC-170265-345 1F430-55.60	60 long			1.25
1	Cord CG-56/U		7CAC-170265-485 1F430-56.6	6 long			0.25
1	Case CY-82/AP	Wood	7CAC-176573-67 3F2529-82	9.5	10.5	10.25	7.63
4	Lamp Type A-15 (Westinghouse)		3300-697200125 6Z6815-24.1				
1	Handbook of Maintenance Instructions, AN08-35TS87-2						
						Total:	18.32

RADIO FREQUENCY WATTMETER TS-118/AP



FUNCTIONAL DESCRIPTION:

A portable, general purpose, test equipment used to measure the average radio frequency power output of radio transmitters. A lossy line and series type thermocouple are used to produce a current, the magnitude of which bears a definite known relationship to the transmitter output power. A DC meter (0 to 1 milliampere scale) indicates the value of current developed by the thermocouple which can be translated into radio frequency average power values by reference to the calibration charts furnished.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Power Supply: 110 volts AC or DC; 50 to 60 cycles per second, single phase, 0.2 amperes for blower motor only.

Frequency Range: 20 to 1000 megacycles per second.

Power Range: 5 to 500 watts. Three ranges covered by different thermocouples.

Input Impedance: 50 ohms.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-979563-3	ASO-R16-AN-TS-118/AP	3F4325-118
PROCUREM'T INFO.: Army Spec. No. 71-5088			
PROCUREM'T COG.: Army		DESIGN COG.: Army, ESL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-118/AP

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)
Accuracy: ±20% of actual average power over temperature range 0 to 122° F.

MANUFACTURERS' OR CONTRACTORS' DATA:
Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio; Order No. 1344-DAY-44; Approximate Cost per Unit, $225.00; 30 June 1944; Contract No. DA-36-039-sc-28492; 6 January 1950, $346.95, 1951.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
TO 16-35TS118-2 (Maintenance Instructions).
TO 16-55-103 (Spare Parts List).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Radio Frequency Wattmeter TS-118/AP (Packed in Wooden Case)	3.48	16	13	29	75

EQUIPMENT SUPPLIED:

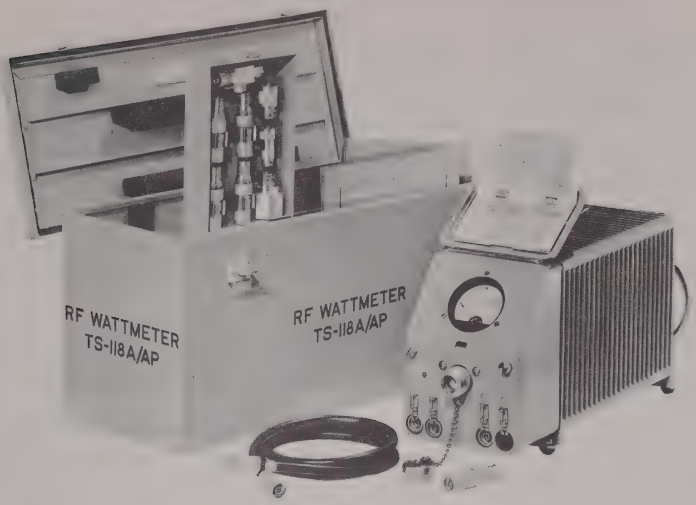
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Frequency Wattmeter TS-118/AP	Metal	7CAC-979563-3 R16-AN-TS-118/AP 3F4325-118	11	8-1/2	24-1/2	26
1	Case CY-174/AP	Wood	7CAC-176572-39 R16-AN-CY-174/AP 3F2623-174	14	12-1/2	28	22
3	Thermocouple (low power) MX-205/AP		7CBE-2090 R16-AN-MX-205/AP 3F3989-205	4 long			
3	Thermocouple (medium power) MX-206/AP		7CBE-2091 R16-AN-MX-206/AP 3F3989-206	4 long			
3	Thermocouple (high power) MX-207/AP		7CBE-2092 R16-AN-MX-207/AP 3F3989-207	4 long			

(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock (USAF) Numbers (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Cord (line) CX-237/U		7CAC-170264-495 R16-AN-CX-237/U 3E6000-237-120	120 long			
1	Cord CG-123/U		7CAC-170265-53 R16-AN-CG-123/U 1F430-123.8	8 long			
1	Cord CG-122/U		7CAC-170265-38 R16-AN-CG-122/U 1F430-122.9	9 long			
1	Cord CG-56/U		7CAC-170265-375 R16-AN-CG-56/U 1F430-56.9	9 long			
2	Radio Frequency Adapter UG-108/U		8850-101900 R16-A-564 2Z7390-108	1-5/8	3/4 OD		
1	Tuning Stub TN-87/AP		7CBE-2298 R16-AN-TN-87/AP 3F5875-87	15-1/2	3-1/4	1-3/8	
1	Calibration Chart (low-medium power range)		6D10105-5A				
1	Calibration Chart (high power range)						
6	Fuses (2 amperes) FU-27		8800-348600 3Z1927				
1	Wrench for #8 Hex-Socket Set Screws						
1	Incandescent Lamp		8800-501180 2Z5903				
1	Book of Instructions TM 11-1036		6D9810-118				
						Total:	48

RADIO FREQUENCY WATTMETER TS-118A/AP



FUNCTIONAL DESCRIPTION:

A portable, general purpose, test equipment used to measure the average radio frequency power output of radio transmitters. The wattmeter may be used as a dummy load by eliminating the thermocouples.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: A thermocouple in series with an absorption type load resistor produces a voltage which is proportional to the transmitter output power. A DC millivoltmeter (calibrated 0 to 1 in 50 divisions) indicates the voltage developed by the thermocouple. This reading can be translated into radio frequency average power values by reference to the calibration charts furnished.

Power Supply: None.

Frequency Range: 20 to 1400 megacycles per second.

Power Range: 5 to 500 watts. Four ranges covered by different thermocouples.

Type of Modulation: CW, AM, or FM.

Voltage Standing Wave Ratio: Less than 1.25 to 1.

Input Impedance: 50 ohms.

Accuracy: ±15% of actual average power over temperature range -20°C. (-4°F.) to +52°C. (+125°F.).

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.		ASO-R16-AN-TS-118A/AP	3F4325-118A
PROCUREM'T INFO.: Spec. MIL-R-11817 (Sig C)			
PROCUREM'T COG.: Army		DESIGN COG.: Army, ESL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-118A/AP

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RADIO FREQUENCY WATTMETER TS-118A/AP

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio; Order No. 1344-DAY-44, Approximate Cost per Unit, $225.00, 30 June 1944; Contract No. DA-36-039-sc-28492, 6 January 1950, Approximate Cost per Unit, $346.95, 1951. Signal Corps Order No. 15112-PHILA-52-04-51.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TM-1036 (Maintenance Instructions).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Radio Frequency Wattmeter TS-118A/AP (Packed in Corrugated Paper Carton)	2.21	13	11-7/8	24-3/4	75

EQUIPMENT SUPPLIED:

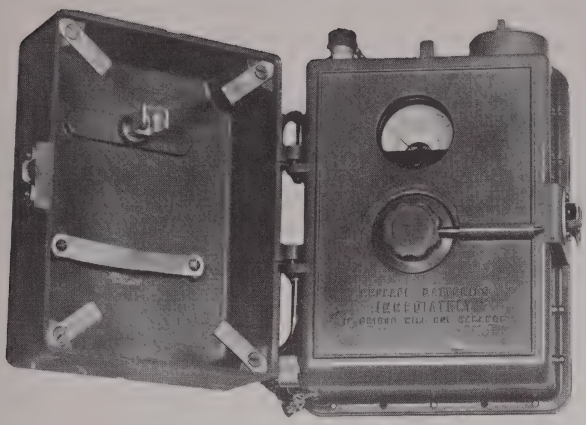
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Frequency Wattmeter TS-118A/AP	Metal	R16-AN-TS-118A/AP 3F4325-118A	8-3/8	5-15/16	20-13/16	27.5
1	Case CY-1764/UPM	Metal	6F300-1764	9-7/8	8-1/2	22	14.2
2	Thermocouple (low power) MX-1785/U		3F34535-600-1	2-7/8 long			0.25
2	Thermocouple (medium power) MX-1781/U		3F34540-1F6-1	2-7/8 long			0.25
2	Thermocouple (high power) MX-1782/U		3F34540-4H8	2-7/8 long			0.25
2	Thermocouple (extra high power) MX-1783/U		3F34540-16-1				0.25 0.25

(Continued)

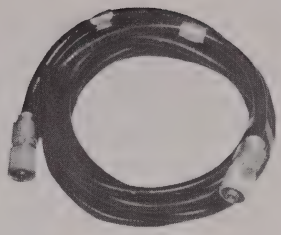
EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches) H	W	D	Weight (Lbs.)
1	Tuning Shunt MX-1784/U		3F33934	2-7/8	3/4	1-1/8	0.31
1	Calibration Chart (low power range)		6D10106-1	5-1/8	3-3/16		
1	Calibration Chart (high power range)		6D10106-2	5-1/8	3-3/16		
2	Book of Instructions TM-1036			11-1/4	8-3/4	1/4	0.28
1	Connector Adapter UG-999A/U		2Z307-271	2-1/2	Hex	1-1/2	0.44
1	Adapter UG-83/U		8850-108745 2Z308-83	1-3/4	3/4D		0.125
1	Adapter UG-213A/U		8850-108861 2Z308-213A	1-1/2	7/8D		0.125
1	Cable Assembly CG-92B/U		7CAC-170265-6 3E4001.394	60	3/4D		0.75
						Total:	45.0

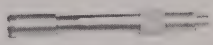
POWER METER TS-125/AP



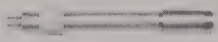
POWER METER



CORD CG-171/AP



ATTENUATORS 10DB AND 16.5DB.



UNCTIONAL DESCRIPTION:

A portable, general purpose, battery operated instrument used to measure average radio frequency power. Two scales are provided. One is calibrated in milliwatts and the other in decibels above and below one milliwatt.

ELATIONSHIP TO OTHER EQUIPMENT:

LECTROMECHANICAL DESCRIPTION:

ircuit Information: This meter consists of a Wheatstone bridge circuit employing a thermistor bead element, a radio frequency matching transformer, and a DC indicating meter. The meter gives full scale deflections when two milliwatts of radio frequency power are applied at the input connector.

ower Supply: 4.5 volts supplied by three Batteries BA-30 (1.5 volt).

requency Range: 2400 to 3335 megacycles per second.

ype of Reception: Continuous Wave or Pulse.

ower Range: 0 to 2 milliwatts, 0 to 4 watts with attenuators; above 4 watts with pick-up antenna.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-801319-2182	ASO-R16-AN-TS-125/AP	3F4325-125
PROCUREM'T INFO.:	Army Spec. No. 71-5067, Navy Spec. No. RE13A1013		
PROCUREM'T COG.:	Army	DESIGN COG.: Army, ESL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
	- Electronics Test Equipment -		TS-125/AP

s project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

Accuracy: ±1/2 decibel day to day accuracy when used with same radar, same dipole, same position relative to radar, same cables and attenuators.

Temperature Range: -20° C. to +60° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Electric Products Company, Chicago, Illinois; Approximate Cost per Unit, $455.00.

Cover-Dual Signal Systems, Inc., 5215 Ravenwood Avenue, Chicago 40, Illinois; Order No. 971-45-RA; 12 January 1948; Approximate Cost per Unit, $262.11; Order No. 289-45-RA, 28 July 1944; Approximate Cost per Unit, $337.86; Order No. 1109-DAY-44, 31 May 1944, Approximate Cost per Unit, $374.73.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TM 11-1217 (Instruction Book).

TO 16-35TS125-5 (Instruction Book).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Two in each box, Power Meter TS-125/AP, less Batteries, including cords and antenna. (MFP, VPP, PIC)	3.75	15-1/2	12	29	55

EQUIPMENT SUPPLIED:

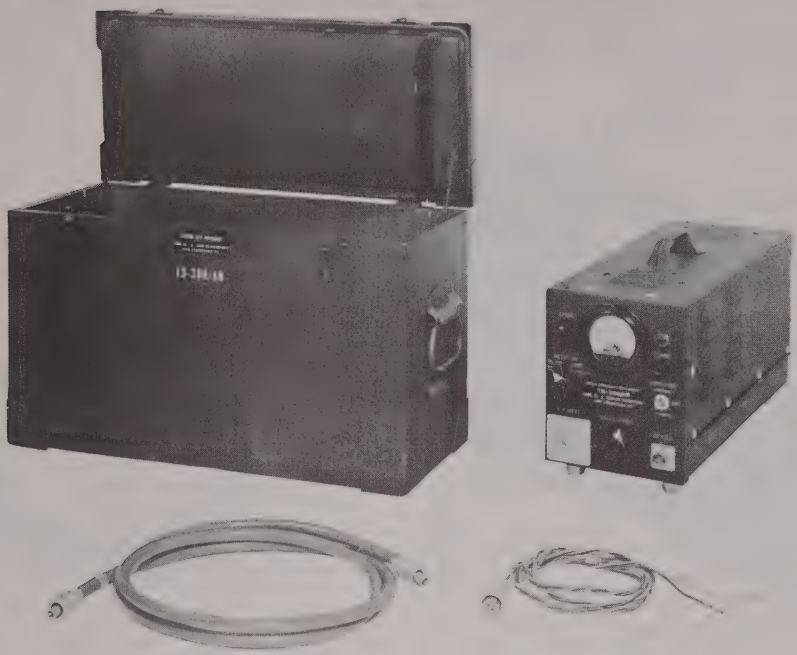
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter TS-125/AP	Aluminum	7CAC-801319-2182 R16-AN-TS-125/AP 3F4325-125	10	7-7/8	5-5/16	12
1	Attenuator CN-42/UP		7CAC-075605 2Z396.42	5			
1	Attenuator CN-43/UP		7CAC-075606-5 2Z396.43	5			
1	Cord CG-171/AP		7CAC-170265-545 R16-A-4934 3E6015-171	111 long			

(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches) H	W	D	Weight (Lbs.)
1	Antenna AT-67/AP		7CAC-657650 3F3988-67	4-1/4	3-1/2		
1	Resistor Thermal		3300-394186054 3Z6926-8.2				
1	Resistor Thermal		3300-394186053 3Z6926-9				
1	Resistor Thermal		3300-394186057 3Z6926-9.1				

RADIO FREQUENC' WATTMETER TS-206/AR



FUNCTIONAL DESCRIPTION:

A portable, general purpose, radio frequency wattmeter for testing high power radar transmitters. Power measurements are read from a 0 to 1 milliamperes DC meter in conjunction with calibration charts.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Radio frequency power is dissipated into a specially constructed 50-ohm resistor encased in a hydrogen-filled atmosphere. Power indications are obtained by the functions of a airflow calorimeter.

Power Supply: 28 volts, DC.

Frequency Range: 20 to 60 megacycles per second.

Power Range: 50 to 1000 watts (average).

Input Impedance: 50 ohms.

Accuracy: ±10%.

Temperature Range: -40° C. to +55° C.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Limited Standard		
STOCK NOS.	7CAC-801319-232	R16-AN-TS-206/AR	3F4325-206
PROCUREM'T INFO.: USAF Spec. No. 271-5096			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, ARL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-206/AR

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RADIO FREQUENCY WATTMETER TS-206/AR

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronics Corporation, 1798 E. 38th Street, Cleveland, Ohio; Order No. 1317-DAY-44, Approximate Cost per Unit, $290.00, 7 September 1944; Order No. 45-7683-ARL, October 1945; Order No. 1043-45-SP, 7 March 1945; Approximate Cost per Unit, $275.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 16-55-180 (Spare Parts List).

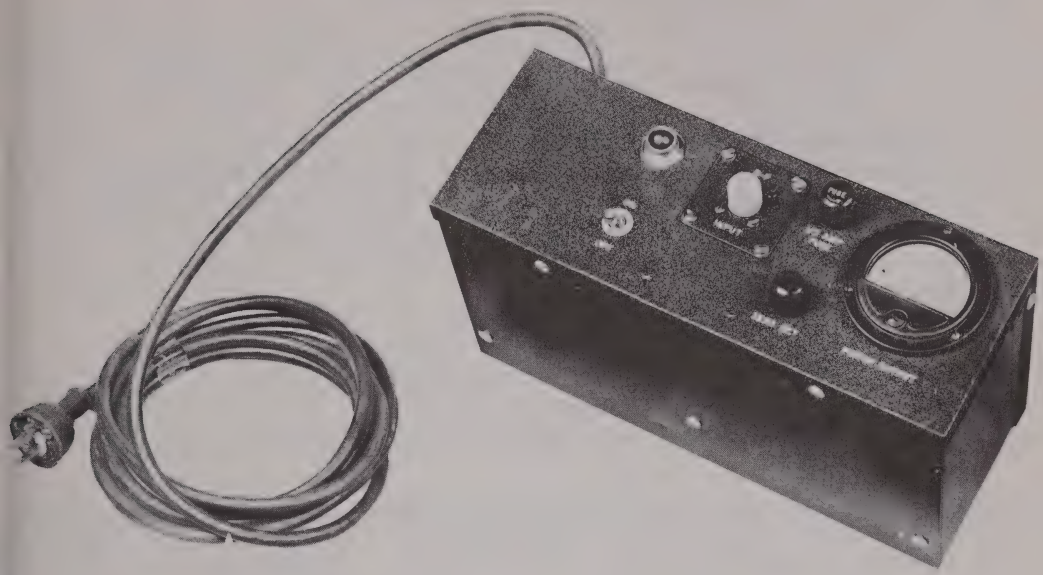
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	TS-206/AR in Case CY-185/AR (Domestic Packed)	2.5	15	11.5	25	50

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	RF Wattmeter TS-206/AR	Metal	7CAC-801319-232 R16-AN-TS-206/AR 3F4325-206	8-1/4	7-3/4	16-1/8	32
1	Cord CG-123/U		7CAC-170265-53 R16-ANCG-123/U 1F430-123.8	84 long			
1	Cord CX-356/U		3E6000-356-120	120 long			
1	Case CY-185/AR	Wood	R16-AN-CY-185/AR 3F4329-185				
1	Book of Instructions		6D9810-206				

POWER METER TS-226A/AP



UNCTIONAL DESCRIPTION:

A portable, general purpose, power meter used to measure peak power levels of ulsed transmitters whose pulse recurrence frequency is greater than 250 pulses er second. A microammeter on the front panel is provided with a scale calibrated o read directly the transmitter peak power output in watts.

ELATIONSHIP TO OTHER EQUIPMENT:

Designed for use with Radar Sets AN/APS-16 and AN/APS-13.

LECTROMECHANICAL DESCRIPTION:

ircuit Information: Consists of a termination diode, integrating network, and a high-impedance vacuum tube voltmeter, calibration circuits, and power supply.
ower Supply: 115 volts, AC, single phase, 50 to 2400 cycles per second.
requency Range: 405 to 425 megacycles per second.
eak Power Range: 0 to 1000 watts without attenuator.
0 to 10,000 watts with attenuator.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-801319-2254		3F4325-226A
PROCUREM'T INFO.: USAF Spec. No. 71-1635			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, ARL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			TS-226A/AP

project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

POWER METER TS-226A/AP

ELECTROMECHANICAL DESCRIPTION:

Average Power: Not to exceed 2 watts with attenuator.
Pulse Width: 0.25 microseconds minimum.
Accuracy: ±15%.
Operating Temperature Range: -40° C. to +55° C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Electronic Corporation of America, New York, New York; Order No. 88-DAY-45RA, 21 September 1944; Approximate Cost per Unit, $151.80; Order No. 2106-DAY-45RA, 31 March 1945; Approximate Cost per Unit, $148.50.

TUBE COMPLEMENT:

1 JAN-559, 1 JAN-6SN7GT, 1 JAN-6H6GT/G.

REFERENCE DATA AND LITERATURE:

TO 16-35TS226-2 (Maintenance Instructions).
TO 16-55-153 (Spare Parts List).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Power Meter TS-226A/AP (Packed MFD, VPP)	1.4	14	20	14	42

EQUIPMENT SUPPLIED:

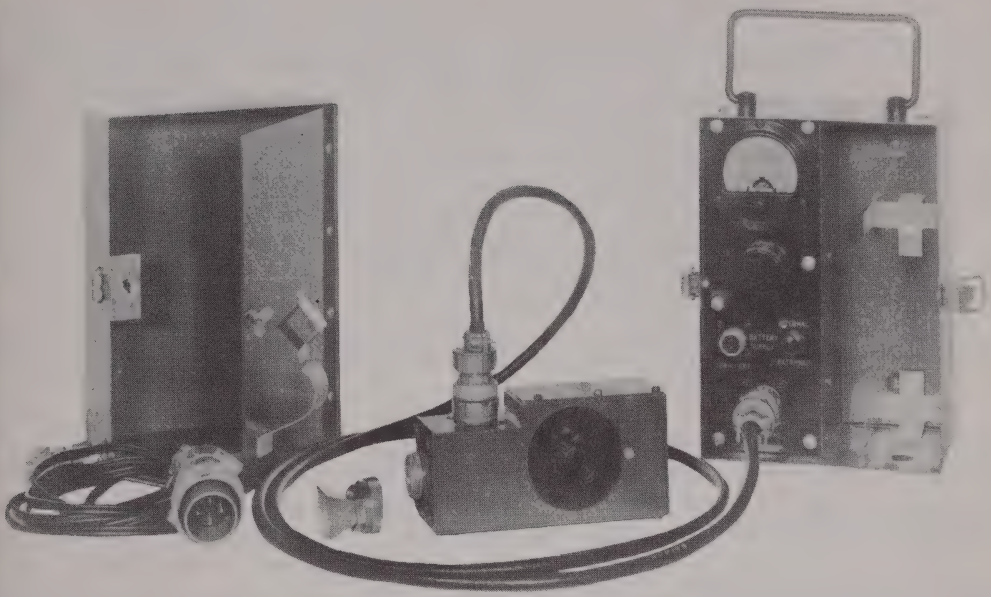
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter TS-226A/AP		7CAC-801319-2254 3F4325-226A	4	10-3/4	7	7.75
1	Case (Including Spare Fuses and Pilot Lamp) CY-271/AP	Wood	7CBM-CX-271AP 2Z1891-271	8-1/2	12	10	8
1	Attenuator CN-24/AP		2Z391-24	1-1/2	1-1/2	3-1/2	0.25

(Continued)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches) H	W	D	Weight (Lbs.)
1	Cord CG-92/U		7CAC-170265 1F430-92.60	60 long			0.75
1	Cord CG-92/U		7CAC-170265-435 1F430-92.20	20-1/4 long			0.38
1	Cord CG-192/AP		7CAC-170265-438 1F430-192.60	60 long			0.75
3	Lamp LM-52 (2 Spare)		8800-444163 2Z5952				
6	Fuse FU-46 (5 Spare)		8800-356110 3Z1946				
1	Instruction Book		6D9810-226A				
						Total:	17.18

POWER METER TS-254/AP
(WATTMETER TS-254/AP)



FUNCTIONAL DESCRIPTION:

A portable, general purpose equipment used for measuring the power output of oscillators or radar transmitters. Average power is indicated directly on a meter which is calibrated in milliwatts and dbm. A toggle switch is provided to permit the use of aircraft power generator when placed in "EXTERNAL" position. All controls and indicators are located on the front panel.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Radio frequency energy from radar system under test is directly coupled to Radio Frequency Head MX-426/AP or picked up by means of Antenna AT-105/AP. The radio frequency energy then passes through a variable attenuator and is subsequently absorbed in the thermistor mount. This changes

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Development		
STOCK NOS.	7CAC-527560	ASO-R16-AN-TS-254/AP	3F4325-254
PROCUREM'T INFO.:	USAF Spec. No. S-7015		
PROCUREM'T COG.:	USAF	DESIGN COG.: USAF, Arm.	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
	- Electronics Test Equipment -		TS-254/AP

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

ELECTROMECHANICAL DESCRIPTION: (Continued)

the resistance of the bead thermistor and unbalances the Wheatstone bridge circuit. The extent of unbalance is indicated on the panel of the power meter.

Power Supply: 6 volts, DC, supplied by four Batteries BA-30 (1.5 volts) or external 28 volts, DC, generator connected to "28 V EXT" receptical and dropped to 6 volts by voltage divider circuit contained within power meter. Current drain 30 milliamperes battery operation, 200 milliamperes external power source.

Frequency Range: 23,520 to 24,480 megacycles per second.

Type of Reception: Continuous Wave, Amplitude Modulated Carrier, Pulsed.

Power Input Range: 1 milliwatt to 631 milliwatts.

Meter Calibration: 0 to 2 milliwatts and -6 to +3 dbm.

Radio Frequency Head Calibration: 0 to 25 decibels.

Sensitivity: -10 dbm to +28 dbm.

Accuracies: ±1.5 decibels (-20° C. to +55° C.).
±2.0 decibels (-40° C. to -20° C.).

MANUFACTURERS' OR CONTRACTORS' DATA:

Electronic Corporation of America, New York, New York; Order No. 280-DAY-45RA; Approximate Cost per Unit, $228.21; Order No. 2104-45, 10 March 1945; Approximate Cost per Unit, $228.21.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 16-35TS254-2 (Maintenance Instructions).
TO 16-55-260 (Spare Parts List).

SHIPPING DATA:

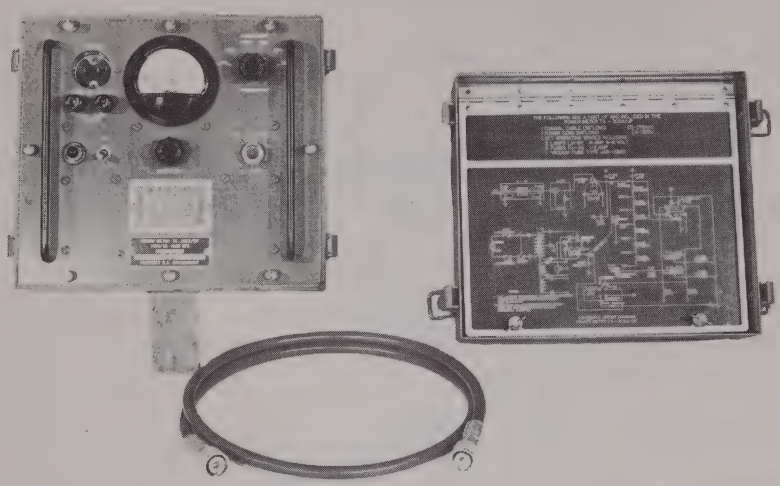
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Over-all Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Power Meter TS-254/AP with accessories (Shelf Package, Water-Resistant Carton)	1.42	17	12	12	32.0

POWER METER TS-254/AP
(WATTMETER TS-254/AP)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Over-all Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter TS-254/AP	Metal	7CAC-527560 R16-AN-TS-254/AP 3F4325-254	8-3/64	5-25/32	5-7/8	5.5
1	Radio Frequency Head MX-426/AP		7CAC-405600 3F3989-426	6	1-7/8	2-3/4	1.5
1	Antenna AT-105/AP		7CAC-045160 2A203-105	1-1/4	1-1/8		0.1
1	Cord CX-715/U		7CAC-170270-1367 3E6000-715	72 long			0.5
1	Cord CX-68/AP		7CAC-170264-435 3E6000-68-120	120 long			0.6
1	Case CY-391/AP	Plywood	2Z1891-391	7	7-1/2	10	6.3
1	Instruction Book		6D9810-254				

POWER METER TS-305A/UP
(WATTMETER TS-305A/UP)



UNCTIONAL DESCRIPTION:

A portable, general purpose meter used to measure peak radio frequency power utput of radio and radar sets. Indication is on a microammeter calibrated in kilo-vatts. It is used in organizational, field, and depot testing.

ELATIONSHIP TO OTHER EQUIPMENT:

It is electrically and mechanically interchangeable with Power Meter TS-305/UP, ut accuracy has been improved, and improved internal parts have been incorporated.

LECTROMECHANICAL DESCRIPTION:

Circuit Information: This meter consists of a radio frequency input circuit and diode detector, a bridge type vacuum tube voltmeter, power supply, and rectifier and a calibrated microammeter. The meter is connected to the power source through a special attenuator RF cable. This cable is fitted with HN type connectors. A power cord is attached.

Power Supply: 115 volts ±10%, AC, 50 to 1600 cycles per second, single phase, 150 milliamperes, maximum, at 60 cycles per second; form factor 1.25 to 1.03; crest factor 1.68 to 1.16.

Frequency Range: 220 to 320 megacycles per second.

Power Range: 0 to 50 kilowatts, calibrated.

nput Impedance: 52 ohms.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-979530		3E213A15
PROCUREM'T INFO.: Spec. MIL-P-5714, dated 27 April 1950			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, Arm.	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14 3.1	
- Electronics Test Equipment -			TS-305A/UP

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

POWER METER TS-305A/UP
(WATTMETER TS-305A/UP)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Meter Sensitivity: 200 microamperes, full-scale deflection.
Accuracy: ±10% of indicated peak power.
Temperature Range: -40° C. to +55° C.
Humidity Range: Up to 95% relative.
Altitude Range: Up to 10,000 feet.

MANUFACTURERS' OR CONTRACTORS' DATA:
Industrial Instruments, Inc., Jersey City 5, New Jersey; Contract AF 33(038)-13689, dated 27 June 1950; Approximate Cost per Unit, $144.00.

TUBE COMPLEMENT:
1 JAN-6SN7GT, 1 JAN-2B22, 1 JAN-6H6GT/G.

REFERENCE DATA AND LITERATURE:
AN 16-35TS305-2 (Operation and Maintenance Instructions).
TO 16-35TS305-4 (Parts Catalog).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Power Meter TS-305A/UP (Domestic Packed)	2.4	17-1/2	15-1/4	15-1/4	32

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter TS-305A/UP	Aluminum	7CAC-979530 3E213A15	12	11-1/4	10-1/2	25.75 (Complete)
1	Cord CG-278A/U		7CAC-170265-366 1F430-278.58	58 long			
1	Cord CX-337/U		7CAC-170264-865 3E6000-337.84	84 long			
5	Fuse, 3AG, 1.5 amp. (Spare)						
2	Lamp LM-52 (Spare)		8800-444163 2Z5952				
1	Instruction Book			8-1/2	11	1/4	
1	Carrying Case	Aluminum		12	11-1/4	10-1/2	

WATTMETER, THRULINE DIRECTIONAL, 50 WATTS, 100-250 MCS.
Model No. 43
(Bird Electronic Corporation)

FUNCTIONAL DESCRIPTION:

A portable, general purpose, direct reading instrument used to measure radio frequency power. The meter is intended to be inserted between the transmitter and the antenna or load resistor and is designed around a 50-ohm line section, equipped with a socket for plug-in measuring elements. Remote indication is possible by removing the RF section from the housing and extending the shielded meter cable to the desired length. This permits inserting the RF section in the coaxial line at a convenient point and locating the indicating meter where visibility is best. The instrument is housed in a rugged cast aluminum case equipped with sockets for extra elements and with a carrying strap.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The circuit includes a line load impedance of 50 ohms and a directional coupler element consisting of a diode rectifier which feeds the RF power to a microammeter graduated in watts. The wattmeter acts as a travel-

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-979564-5		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			Bird Model 43

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

WATTMETER, THRULINE DIRECTIONAL, 50 WATTS, 100-250 MCS.
Model No. 43
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

ling wave instrument with directional sensitivity in respect to the forward and reflected power waves in a transmission line. Thus, at one position of the coupler element, the meter is sensitive to only one of these two waves while being highly insensitive or nulled to the other. The sensitive direction is selected by rotating the element as indicated by the arrow on the element itself. The meter then indicates directly the power flowing in either the forward or the reflected direction.

Power Supply: None required.

Frequency Range: 100 to 250 megacycles per second. (The frequency range may be extended by additional elements for other ranges as needed.)

Power Range: 0 to 50 watts.

Impedance: 50 ohms.

Voltage Standing Wave Ratio: Less than 1.05.

Type of Connectors: Quick-change type female "N" normally furnished unless otherwise specified.

Accuracy: ±5% of full scale.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio; Approximate Cost per Wattmeter (less element), $95.00; elements, $30.00 each.

TUBE COMPLEMENT:

Diode rectifier.

REFERENCE DATA AND LITERATURE:

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

WATTMETER, THRULINE DIRECTIONAL, 50 WATTS, 100-250 MCS.
Model No. 43
(Bird Electronic Corporation)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter, Thruline Directional, 50 Watts, 100-250 mcs. Bird Model 43	Cast Alumi-num	7CAC-979564-5	7	4	3	4

WATTMETER, RF
Model 61
(Bird Electronic Corporation)

FUNCTIONAL DESCRIPTION:

This is a portable, general purpose air-cooled device designed for applications such as bench testing the output of transmitters, measuring transmission line losses, and testing coaxial line insertion devices. This is an absorption or terminal type wattmeter.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The wattmeter is built around a coaxial resistor which is the transmitter load element. Power input to the resistor is measured by means of a dual-range crystal voltmeter arrangement. The DC meter of the voltmeter reads directly in RF watts. Either of two scales may be selected by inserting the crystal diode in the desired one of two sockets on the front panel. The space between the load resistor and radiator fins is oil filled to permit rapid heat dissipation.

Power Supply: None required.

Frequency Range: 30 to 500 megacycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-979519		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			Bird 61

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

WATTMETER, RF
Model 61
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Type of Modulation: CW, AM, FM, or Television type signals. Not designed for use on pulsed power similar to radar.
Power Range: 2 to 60 watts (as a wattmeter), 0 to 80 watts (as a dummy load).
Meter Ranges: 0 to 15 and 0 to 60 watts.
Impedance: 51.5 ohms.
Accuracy: ±5%.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 E. 38th Street, Cleveland 14, Ohio.

TUBE COMPLEMENT:

1 JAN-1N21B.

REFERENCE DATA AND LITERATURE:

Bird Electronic Corporation, "Instruction Book for the Termaline RF Wattmeter."

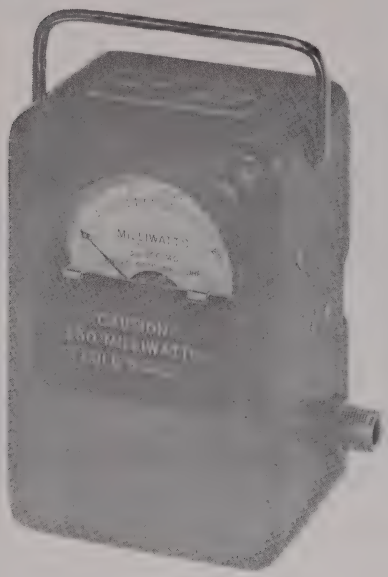
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter, RF (Bird 61)					8.5

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter, RF (Bird 61)		7CAC-979519	6	4	8	7

RF WATTMETER
MODEL NO. 62S5
(Bird Electronic Corporation)



UNCTIONAL DESCRIPTION:

A portable, general purpose, direct reading, absorption type instrument used to neasure power on VHF transmitters. Measurements are made on a single scale)C meter calibrated in RF watts.

ELATIONSHIP TO OTHER EQUIPMENT:

Used to test Radio Sets such as AN/URC-4.

LECTROMECHANICAL DESCRIPTION:

Circuit Information: With the termaline coaxial load resistor (Model 80-5) dissipating all power applied, a crystal diode feeds the DC meter circuit. The meter has a D'Arsonval movement.

Power Supply: None required.

Frequency Range: 30 to 500 megacycles per second.

Power Range: 0 to 0.25 watts.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	

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RF WATTMETER
MODEL NO. 62S5
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Type of Transmission Tested: Continuous Wave, Amplitude Modulated, Frequency Modulated.
Impedance: 51.5 ohms.
Voltage Standing Wave Ratio: 1.15 maximum.
Type of Connector: Type N female.
Accuracy: 10% approximately.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio; Engineering Model Cost per Unit, $225.00, 9 May 1951.

TUBE COMPLEMENT:

Crystal Diode.

REFERENCE DATA AND LITERATURE:

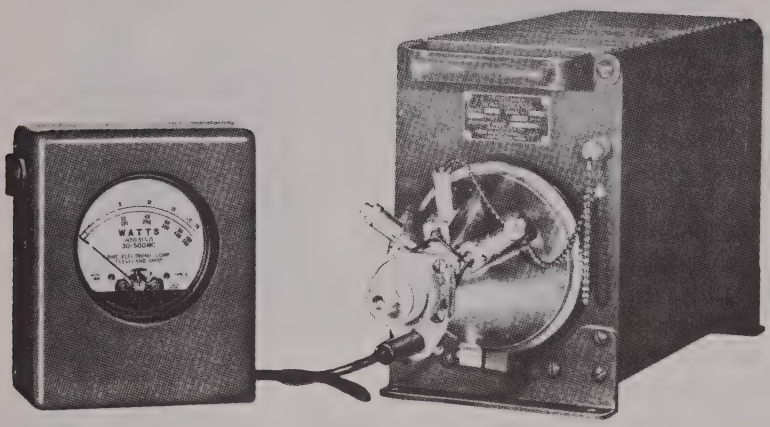
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	RF Wattmeter Model No. 62S5	0.08	6-1/2	4-1/2	4-1/2	5

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	RF Wattmeter Model No. 62S5	Metal		6	4	4	4

TERMALINE WATTMETER
MODEL 67
(Bird Electronic Corporation)



FUNCTIONAL DESCRIPTION:

A portable, general purpose, direct reading, absorption type instrument used for power measurements of low and medium power VHF transmitters. Measurements are read on a triple scale DC meter calibrated in RF watts.

RELATIONSHIP TO OTHER EQUIPMENT:

Used as interim for TS-118A/AP RF Wattmeter when testing AN/APT-9.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: With the termaline coaxial load resistor dissipating all the power applied, a crystal voltmeter circuit built into the input connector of the wattmeter feeds the DC meter circuit. The meter has D'Arsonval movement. Range selection is accomplished by inserting crystal rectifier in proper socket.

Power Supply: None required.

Frequency Range: 30 to 500 megacycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-977600		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14. 3. 1	
	- Electronics Test Equipment -		Bird Electronic 67

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TERMALINE WATTMETER
MODEL 67
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Power Range: 0 to 500 watts; triple range 0 to 25 watts, 0 to 100 watts, 0 to 500 watts. A small fan is necessary across fins for continuous use at 500 watts.

Types of Transmission Tested: Continuous Wave, Amplitude Modulation, Frequency Modulation. Not calibrated for pulsed power at low duty cycles.

Impedance: 51.5 ohms.

Voltage Standing Wave Ratio: Less than 1.1.

Scale Type: Expanded at low scale readings; the 10-watt point on the 100-watt scale appears at 1/5 of full scale.

Input Connector: Type N female.

Accuracy: Within 5% of full scale. Repeatability 1% for readings on any one instrument. Agreement 3% between various similar models.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Approximate Cost per Unit, #350.00

TUBE COMPLEMENT:

1 JAN-1N21B (Crystal Rectifier).

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog "Instrumentation for Coaxial Transmission."

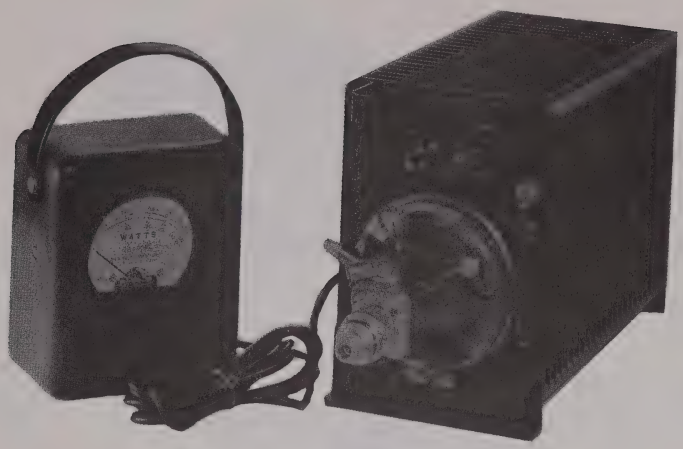
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Termaline Wattmeter Model 67					50

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Termaline Wattmeter Model 67	Aluminum	7CAC-977600	8-1/2	6	17	30
1	Adapter (which fits UG-21/U or UG-21B/U on RG-8/U Cable)						
2	Crystal JAN-1N21B (1 Spare)						

WATTMETER
Model 67C
(Bird Electronic Corporation)



FUNCTIONAL DESCRIPTION:

This is a portable, general purpose, water-cooled device designed for applications such as bench testing the output of transmitters, measuring transmission line losses, and testing coaxial line insertion devices.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument consists of a water-cooled coaxial resistor and a connecting voltmeter circuit. The radio frequency power is dissipated in the resistor which contains copper tubing with provisions for connecting to a tap water outlet or other water supply. The water is used as a head exchanger and not as a dielectric. The voltmeter circuit consists of a DC voltmeter with a silicon crystal rectifier. The meter dial reads directly in RF watts. Desired range is obtained by inserting the crystal in the proper socket.

Power Supply: None required.

Frequency Range: 30 to 500 megacycles per second.

Power Range: 0 to 2500 watts.

Meter Ranges: 0 to 100 watts, 0 to 500 watts, 0 to 2500 watts.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
	- Electronics Test Equipment -		Bird 67C

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

WATTMETER
Model 67C
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Impedance: 51.5 ohms.
Input Connector: Type UG-59A/U.
Accuracy: 5%.
Minimum Water Flow Rate: 1/2 gallon per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:
Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio.

TUBE COMPLEMENT:
1 JAN-1N21B.

REFERENCE DATA AND LITERATURE:
Bird Electronic Corporation "Coaxial Line Instruments."

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter (Bird 67C)					40

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter (Bird 67C)						
	Including:						
1	Dummy Load			9	6	21	30
1	Voltmeter						

RF WATTMETER
MODEL 611
(Bird Electronic Corporation)

UNCTIONAL DESCRIPTION:

A portable, general purpose, direct reading, absorption type instrument used to neasure power and facilitate tuning on low and medium power VHF transmitters. Measurements are made on a dual scale, DC meter calibrated in RF watts. It may lso be used as a dummy load of 51.5 ohms up to 60 watts.

ELATIONSHIP TO OTHER EQUIPMENT:

Similar to RF Wattmeter AN/URM-43 (overall nomenclature for the ME-11/U) xcept the AN/URM-43 includes accessories not furnished with the commerical item.

LECTROMECHANICAL DESCRIPTION:

Circuit Information: With the termaline coaxial load resistor dissipating all power applied, a crystal voltmeter circuit built into the input connector of the wattmeter feeds the DC meter circuit. The meter has a D'Arsonval movement. Range selection is accomplished by inserting crystal rectifier in proper socket.

Power Supply: None required.

Frequency Range: 30 megacycles per second to 500 megacycles per second.

Power Range: 0 to 60 watts in two ranges, 0 to 15 and 0 to 60 watts.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	

s project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RF WATTMETER
MODEL 611
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Type of Transmission Tested: Continuous Wave, Amplitude Modulation, Frequency Modulation. Not calibrated for pulsed power at low duty cycles.

Impedance: 51.5 ohms.

Voltage Standing Wave Ratio: Less than 1.1.

Input Connector: Type N female. Takes UG-21/U or UG-21B/U on RG-8/U cable.

Accuracy: Within 5% of full scale. Repeatability 1% for readings on any one instrument. Agreement 3% between various similar models.

MANUFACTURERS' OR CONTRACTORS' DATA:

Bird Electronic Corporation, 1800 E. 38th Street, Cleveland 14, Ohio; Approximate Cost per Unit, $175.00, 14 March 1953.

TUBE COMPLEMENT:

1 JAN-1N21B (Crystal Rectifier).

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog "Instrumentation for Coaxial Transmission."

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	RF Wattmeter Model 611					8.5

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	RF Wattmeter Model 611	Aluminum		6	4	8	7
1	Crystal Diode 1 JAN-1N21B (Spare)						

WATTMETER, TERMALINE
Model 613
(Bird Electronic Corporation)

FUNCTIONAL DESCRIPTION:

This is a portable, general purpose, air-cooled device designed for radio frequency applications such as bench testing the output of transmitters, measuring transmission line losses, and testing coaxial line insertion devices.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument consists of an air-cooled coaxial resistor and a connecting voltmeter circuit. The radio frequency power is dissipated in the resistor which is cooled by an axial flow, ball bearing, capacitor type blower. A thermal interlock switch protects the unit in event of a power or blower failure. The voltmeter circuit consists of a DC voltmeter with a silicon crystal rectifier. The meter dial reads directly in RF watts.

Power Supply: 110 volts, 60 cycles per second, single-phase, 3 amperes.

Frequency Range: 30 to 500 megacycles per second.

Power Range: 0 to 1500 watts.

VSWR: 1.15 at 1000 megacycles per second.

Meter Range: 0 to 1500 watts.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	

s project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

WATTMETER, TERMALINE
Model 613
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Impedance: 51.5 ohms.
Input Connector: UG-154/U.
Accuracy: 5%.
Air Flow Rate: 400 cubic feet per minute at 3000 revolutions per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:
Bird Electronic Corporation, 1800 East 38th Street, Cleveland 14, Ohio.

TUBE COMPLEMENT:
1 JAN-IN21B.

REFERENCE DATA AND LITERATURE:
Bird Electronic Corporation "Coaxial Line Instruments."

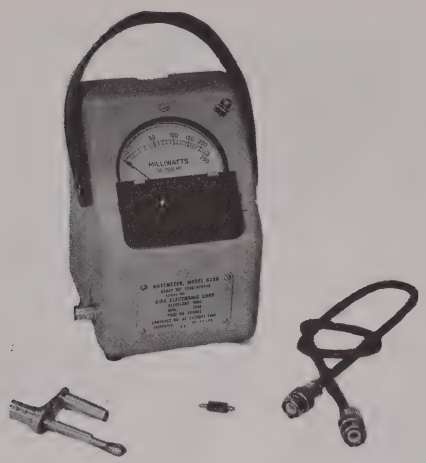
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter, Termaline (Bird 613)					100

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter, Termaline (Bird 613)						
	Including:						
1	Dummy load			12	9	32	65
1	Voltmeter						

WATTMETER, RF
Model 6250
(Bird Electronic Corporation)



FUNCTIONAL DESCRIPTION:

This is a portable, general purpose, direct reading, absorption type instrument used to measure the power output of low power transmitters. An adapter plug provided with the wattmeter permits it to be used specifically in measuring the output of the AN/URC-4.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The wattmeter circuit consists of a microammeter and a load resistor housed together in a ruggedized case. The microammeter is scaled to read the current directly in milliwatts. The load resistor circuit contains a crystal rectifier and the load resistor which has been calibrated at the time of assembly. The special adapter plug included with the wattmeter is used in testing the AN/URC-4 transmitter. The adapter plug consists of a double contact device specifically designed to make electrical connection with the transmitter antenna. The RF current is fed through an RF cable assembly into the load resistor assembly in the wattmeter case. A sample of this current is rectified by the crystal rectifier and fed through the DC cable assembly into the microammeter which gives indication in RF milliwatts. The RF cable, the adapter plug, and a spare crystal are stored inside the back of the wattmeter case.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-979519-75		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			Bird 6250

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

WATTMETER, RF
Model 6250
(Bird Electronic Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: None.
Meter Range: 0 to 250 milliwatts.
Frequency Range: 30 to 500 megacycles per second.
Input Impedance: 51.5 ohms.
Accuracy: ± 15%.
Type of Modulation: CW or AM type signals.
Termination VSWR: 1.00 to 1.15.
Connectors: BNC (female) on wattmeter unit.
BNC (male) at each end of RF cable.

MANUFACTURERS' OR CONTRACTORS' DATA:
Bird Electronic Corporation, 1800 E. 38th Street, Cleveland 14, Ohio; Contract AF 33(604)7861; Approximate Cost per Unit, $67.78.

TUBE COMPLEMENT:
1 JAN-G7C (germanium diode).

REFERENCE DATA AND LITERATURE:
Operating and Maintenance Manual.

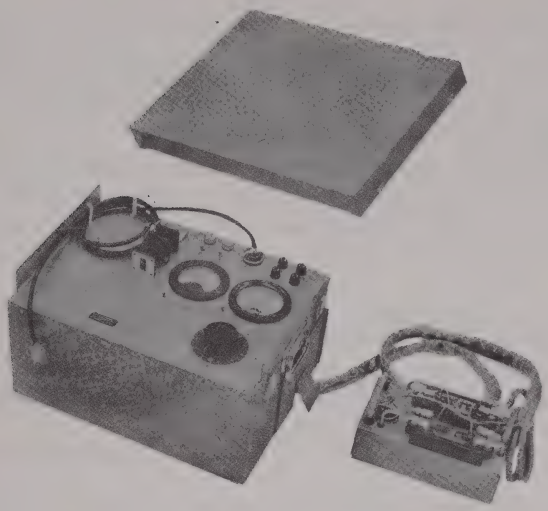
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Wattmeter, RF (Bird 6250)	0.053				

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Wattmeter, RF (Bird 6250)		7CAC-979519-75	5-7/8	4-1/4	3-5/8	2.5
	Including:						
1	Power Cord RF-58/U			18	5/8 dia.		
1	Adapter Plug (Bird 293)			2-3/4	1-1/2	5/8	
1	Spare Crystal (G7C)			3/4	9/32 dia.		

CALORIMETER
Part No. D-7604681
(General Electric Company)



FUNCTIONAL DESCRIPTION:

This is a portable, self-contained unit designed to measure the radio frequency power of x-band radar equipment such as the AN/APG-32, AN/APG-32A, and AN/APG-41. The test set can be used either on the aircraft or at the test bench.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The calorimeter consists essentially of two systems: a closed cycle fluid flow system, and an electrical system.

A flow of fluid, circulated by an internal pump, is passed into a thermopile, then through an x-band liquid load where radio frequency energy is converted directly to heat energy. The heated fluid then leaves through the thermopile outlet. The temperature differential between the fluid inlet and outlet of the thermopile develops an electromotive force which is delivered to one terminal of a galvanometer on the instrument panel.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-170278-65		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment -			G.E. D-7604681

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

CALORIMETER
Part No. D-7604681
(General Electric Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

The fluid continues through the inlet of a second thermopile, through a resistance load, and through the thermopile outlet. Again a temperature differential exists because of AC power applied to the heater in the resistance load. The electromotive force developed by this second thermopile is delivered to the other terminal of the galvanometer.

Power to the heater in the resistance load is adjusted by the use of an autotransformer in the test equipment. When enough AC power is applied to the resistance load that the second thermopile electrical output equals that of the first thermopile, the electrical forces will balance each other, and the galvanometer will read zero.

When this zero point is reached, the radio frequency power can be read directly on the wattmeter in the electrical circuit.

In addition to the galvanometer, wattmeter, and power control, the panel mounts a range selector switch which permits two rates of liquid flow for either low or high range by the use of solenoid valves.

A radiator and fan in the assembly keep the fluid temperature down for continuous operation.

Power Supply: 115 volts, AC, 50 to 420 cycles per second, single-phase, 0.6 kilowatt.

RF Power Range: Low: 0 to 100 watts.
High: 100 to 400 watts.

MANUFACTURERS' OR CONTRACTORS' DATA:

General Electric Company, Schenectady, New York; Contract No. AF 33(038)-30520; Approximate Cost per Unit, $5,000.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-5-95-1 (Operation and Service Instructions).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

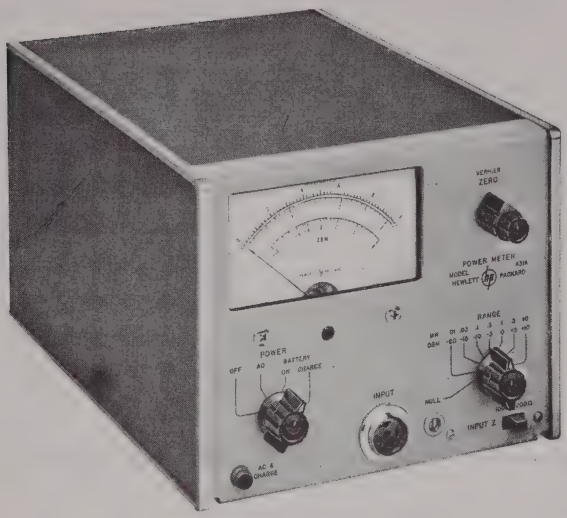
CALORIMETER
Part No. D-7604681
(General Electric Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Calorimeter (General Electric D-7604681)	Metal	7CAD-170278-65	12	21	15	

42

POWER METER
MODEL 431A
(Hewlett-Packard Company)



FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure radio frequency power levels. The instrument may be used for coaxial or waveguide transmission line measurements. Test results are indicated directly in watts or decibels referred to one milliwatt by means of a panel meter or the indicator output may be fed to an external recorder or voltmeter.

RELATIONSHIP TO OTHER EQUIPMENT:

The Hewlett-Packard Thermistor Mounts Model 486A and Model 478A are required but not supplied with the power meter. A rechargable battery pack is available for use with the Model 431A.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The power meter essentially consists of two identical balanced transformer bridges, an audio oscillator, a metering circuit and a power supply. The transformer bridges are connected in series and are both fed a ten kilo-

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
	- Electronics Test Equipment - Hewlett-Packard 431A		

POWER METER
MODEL 431A
(Hewlett-Packard Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

cycle per second oscillator signal. One bridge is self-balanced by the audio frequency voltage while the second bridge is self-balanced by a direct current. The radio frequency power being measured is applied to the first bridge causing an unbalanced condition. The unbalanced condition is corrected by a change in the oscillator output corresponding to the amount of radio frequency power applied to the thermistor. Since the bridge transformers are in series the change in the oscillator output also unbalances the second bridge circuit. The second bridge is then automatically rebalanced by a direct current. The change in direct current is amplified and fed to the indicator causing a deflection proportional to the power being measured. The instrument is so constructed that zero set will hold for long periods of time.

Power Supply: 115 or 230 volts ±10%, AC, 50 to 1000 cycles per second, 1.5 watts.
Power Range: 0 to 0.01, 0.03, 0.1, 0.3, 1.0, 3.0 and 10 milliwatts; -30 to +10 decibels referred to 1 milliwatt.
Accuracy: ±3% of full scale reading.
Thermal Drift: Less than 2 microwatts per degree centigrade.
Thermistor Impedance: 100 or 200 ohms.
Output: 1.0 milliamp into 2000 ohms maximum.

MANUFACTURERS' OR CONTRACTORS' DATA:

Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, California; Approximate Cost per Unit, $345.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Power Meter Hewlett-Packard 431A					

POWER METER
MODEL 431A
(Hewlett-Packard Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Meter Hewlett-Packard 431A	metal		6-1/2	7-1/2	12-1/2	10
1	Cord, Inter-connecting			5 long			

TRANSISTOR MICROWAVE POWER METER
MODEL P-3
(Polarad Electronics Corporation)

FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure absolute radio frequency power levels. The instrument may be used for testing or calibrating signal generators, attenuators, traveling-wave tubes, coaxial cables or waveguide systems. Test results are indicated directly on a panel meter.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The power meter consists of two major components, an indicator unit and a thermistor mount. The indicator functions on the audio substitution principle. The thermistor is the power sensitive element used as one arm of an audio bridge. The bridge is initially balanced by direct current bias and an audio power fed to the thermistor element. When radio frequency power is received by the thermistor the bridge becomes unbalanced. Due to feedback, the audio power fed to the bridge is decreased to rebalance the bridge. The

(continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.L.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
	- Electronics Test Equipment -		Polarad P-3

TRANSISTOR MICROWAVE POWER METER
MODEL P-3
(Polarad Electronics Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)
amount of decrease of the audio power is a direct indication of the radio frequency power applied to the thermistor. The change of audio power is indicated by a vacuum tube voltmeter circuit. The thermistor mounts are connected to the bridge circuit by a type BNC connector. The lower frequency thermistor is provided with a type N input connector and the remaining four with waveguide input connectors. Only average power of a pulsed source may be measured due to a long thermistor thermal time constant.

Power Supply: 115 volts ±15%, AC, 60 cycles per second, 30 milliamps or 1.5 volt, DC, supplied by four D cells.

Frequency Range: 10 to 40,000 megacycles per second.

Power Range: 0 to 0.1, 0.3, 1.0, 3.0, and 10.0 milliwatts full scale. (Also direct reading in decibels referred to 1 milliwatt from -20 to + 10.)

Accuracy: ±5% of full scale reading.

Thermistor Mounts: 5 mounts; 10 to 10,000 megacycles per second at 1.5 vswr; 8.2 to 12.4 kilomegacycles per second at 1.5 vswr; 12.4 to 18 kilomegacycles per second at 2.0 vswr; 18 to 26.5 kilomegacycles per second at 2.0 vswr; 26.5 to 40 kilomegacycles at 2.5 vswr.

MANUFACTURERS' OR CONTRACTORS' DATA:
Polarad Electronics Corporation, 4320 34th Street, Long Island City 1, New York; Approximate Cost per Unit, $295.00 plus $70.00 per Thermistor Mount.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

SHIPPING DATA:

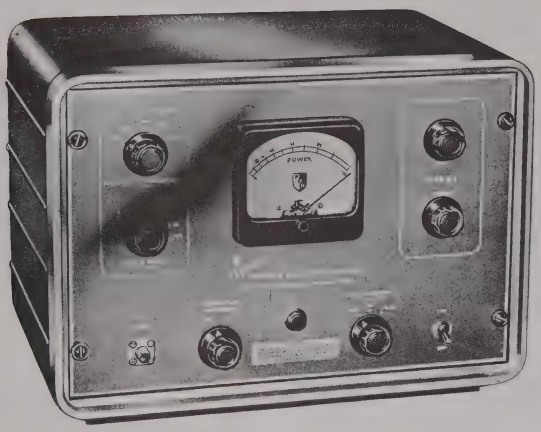
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Transistor Microwave Power Meter Polarad P-3					

TRANSISTOR MICROWAVE POWER METER
MODEL P-3
(Polarad Electronics Corporation)

QUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Transistor Microwave Power Meter Polarad Model P-3	Metal		8	5	6	6
1	Thermistor Mount TM-1						
1	Thermistor Mount TM-2						
1	Thermistor Mount TM-4a						
1	Thermistor Mount TM-6a						
1	Thermistor Mount TM-9a						

POWER BRIDGE
Type 650B
(Polytechnic Research and Development Company, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument designed to measure RF power levels.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The power bridge is essentially a feedback amplifier and a modified Wheatstone bridge utilizing a power sensitive element as one arm of the bridge. The power sensitive element may be a bolometer, thermistor, or barretter from 50 through 250 ohms. The output power of the feedback amplifier is measured by an integral vacuum-tube voltmeter. The bridge is initially balanced with a self-contained 10 kilocycle per second voltage and a bias current. When the RF power to be measured is introduced into the power sensitive detector, the bridge is unbalanced. The feedback amplifier automatically rebalances the bridge by reducing the output of the 10 kilocycle per second power

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.1	
- Electronics Test Equipment - Polytechnic 650B			

POWER BRIDGE
Type 650B
(Polytechnic Research and Development Company, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)

being fed to the detector. The vacuum-tube voltmeter indicates the difference in output of the amplifier which is equivalent to the RF power being measured. The power in milliwatts is read directly on a panel meter. An additional 0 to -10 decibel scale is included for attenuation measurements. A control is provided to vary one arm of the bridge circuit so that detectors with different resistances may be employed. Either positive or negative temperature coefficient detectors may be used.

Power Supply: 115 or 230 volts, AC, 50 to 60 cycles per second, 95 watts.
Power Range: 0.1, 0.3, 1.0, 3, 10 and 100 milliwatts.
Accuracy: ±5% full scale.
Detector Resistance: 50, 100, 150, 200 or 250 ohms ±10%.
Temperature Coefficient: Positive or negative.
Bias Range: 3 to 11 and 11 to 40 milliamps.

MANUFACTURERS' OR CONTRACTORS' DATA:

Polytechnic Research and Development Company, Incorporated, 202 Tillary Street, Brooklyn 1, New York; Approximate Cost per Unit, $320.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Power Bridge Polytechnic 650B	metal		10-1/8	14-3/8	8-1/2	21

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Power Bridge Polytechnic 650B					

RADIO TEST SET AN/ARM-6
(TEST SET, RADIO, AN/ARM-6)

FUNCTIONAL DESCRIPTION:

A portable, special purpose set, used for checking the RF output of the transmitter of a receiver-transmitter radio set. Indication is provided by an indicator lamp. The brightness of the lamp gives a qualitative check on the magnitude of output. The set serves primarily as an operational tester. It is used at the organizational level only.

RELATIONSHIP TO OTHER EQUIPMENT:

This set is used in testing Radio Receiver-Transmitter RT-128/ARC-21, a component of Radio Set AN/ARC-21, and -21X.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The circuit consists of a fixed dummy load, a radio frequency cable (to connect the transmitter output to the dummy load) and an indicator lamp. The indicator lamp is in parallel with the non-inductive resistance load of the dummy load. Radio frequency plugs are provided for necessary connections.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: USAF, C&N	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.3.2	

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

RADIO TEST SET AN/ARM-6
(TEST SET, RADIO, AN/ARM-6)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: None.
Frequency Range: 2 to 24 megacycles per second.
Input Impedance: 100 ohms, resistive.
Indicator Lamp Rating: 6 watts, 115 volts, (Type S).

MANUFACTURERS' OR CONTRACTORS' DATA:
Radio Corporation of America, Camden, New Jersey; USAF Contract AF 33(600) 24390, dated 25 April 1953; RCA Dwg. C-748606.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:

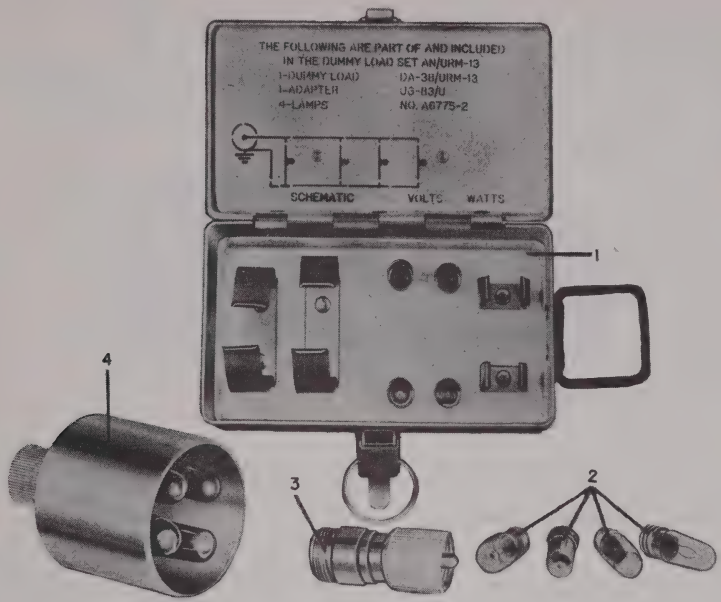
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Radio Test Set AN/ARM-6 Including:	Aluminum					2.25 (Complete)
1	Electrical Dummy Load DA-84/ARM-6			9-1/4	3-1/8	1-1/4	0.69
1	Test Set Case, CY-1407/ARM-6		with handle up with handle down	10-1/4 10 1/4	6-1/8 4-3/8	2-3/8 3-3/16	1.12
1	RF Cable Assembly, CG-1076/U			9 long	7/8 dia. o/a		0.44

DUMMY LOAD SET AN/URM-13
(INDICATOR, ELECTRICAL POTENTIAL, AN/URM-13)



UNCTIONAL DESCRI TION:
A portable dummy load used to indicate the presence of RF radiant energy output f signal generating equipment. Lamp bulbs glow when RF current is flowing. This s the only indication of RF power provided.

ELATIONSHIP TO OTHER EQUIPMENT:
Similar to Phantom Transmitting Antenna TS-78/U plus UG-83/U and case.

LECTROMECHANICAL DESCRIPTION:
ircuit Information: Consists of four screw base (Number 1476) Mazda pilot lamps connected in parallel across a coaxial connector.
ower Supply: None required.
requency Range: 0 to 400 megacycles per second.
ower Input Range: 3 to 10 watts normal range, but will measure a maximum of 12 watts.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAC-274350		2A1859
PROCUREM'T INFO.:	USAF Spec. MIL-D-5859A, dated 16 May 1950		
PROCUREM'T COG.:	USAF	DESIGN COG.:	USAF, C&N
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	14.3.2
	- Electronics Test Equipment -		AN/URM-13

project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

DUMMY LOAD SET AN/URM-13
(INDICATOR, ELECTRICAL POTENTIAL, AN/URM-13)

MANUFACTURERS' OR CONTRACTORS' DATA:

Bendix Aviation Corporation, Baltimore 4, Maryland; Contract Nos. W 33-038-ac-13465, AF 33(038)-5652; Approximate Cost per Unit, $35.00.

Wac Engineering Company, 35 South St. Clair Street, Dayton, Ohio; Contract No. AF 33(038)26223, 14 July 1952; Approximate Cost per Unit, $13.52.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 16-30URM13-1 (Operating Instructions).
TO 16-30URM13-2 (Service Instructions).
TO 16-30URM13-4 (Parts Catalog).
TO 16-30URM13-11 (Operating Instructions).
TO 16-30URM13-12 (Service Instructions).
TO 16-30URM13-14 (Parts Catalog).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dummy Load Set AN/URM-13 Including:		7CAC-274350 2A1859				
1	Dummy Load DA-38/URM-13			1.75	3	1.75	0.312
1	Case CY-777/URM-13	Aluminum	7CAC-176573-62 2Z1891-777	2.562	5.0	2.875	0.550
1	Adapter UG-83/U		8850-108745				
8	Mazda Lamps (4 Operating) (4 Spares)						
						Total:	1.0

PROBE, WAVEGUIDE MX-2144/U

FUNCTIONAL DESCRIPTION:

A portable, general purpose device used as the power sensitive element of a bolometer bridge.

RELATIONSHIP TO OTHER EQUIPMENT:

The MX-2144/U is used with Wattmeter AN/URM-98 or equivalent and is similar to the Hewlett-Packard Coaxial Thermistor Mount Model 477B.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The probe is comprised of two thermistors, each 100 ohms, in a parallel circuit configuration to RF power input and in series to the bridge balancing circuit. The thermistors are the negative temperature, long thermal time constant type. The device incorporates a type N input connector and a type BNC output connector.

Power Supply: None.

Frequency Range: 0.01 to 10 kilomegacycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Navy	
F.L.I.N.: 4935-560-2609		FUNCTIONAL CLASS. NO.: 14.3.3	

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Range: 0.01 to 10 milliwatts.
Input Impedance: 50 ohms.
Output Impedance: 200 ohms.
Standing-Wave Ratio: Less than 1.3 from 0.05 to 5 kilomegacycles per second, less than 1.5 to 10 kilomegacycles per second.

MANUFACTURERS' OR CONTRACTORS' DATA:
Hewlett-Packard Company, 1501 Page Mill Road, Palo Alto, California; Contract No. N383-41079A; Approximate Cost per Unit, $75.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
Manufacturer's Literature.

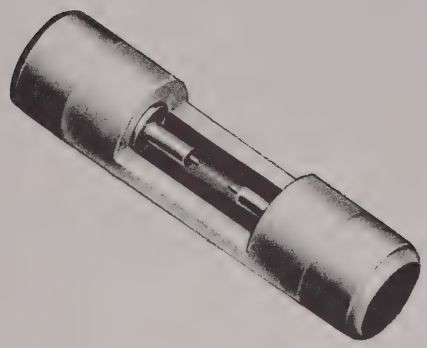
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Probe, Waveguide MX-2144/U	Plastic		3	1.0 dia.		1

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Probe, Waveguide MX-2144/U					

BARRETTER
MODEL NO. 821
(Sperry Gyroscope Company)



UNCTIONAL DESCRIPTION:

A general purpose, small resistive element used for converting microwave energy into heat energy. When used with wattmeter bridges, the change in resistance aused by this heat can be used to measure low-level microwave power. Because f its square-law characteristics, the barretter is useful as a simple detector in he measurement of relative power levels. Errors in slotted-line voltage standing ave ratio measurements caused by the deviation from square-law characteristics f the detector may be avoided by the use of barretters.

ELATIONSHIP TO OTHER EQUIPMENT:

Used to test Radio Sets such as AN/TRC-30.

LECTROMECHANICAL DESCRIPTION:

ircuit Information: Consists of a fine platinum wire mounted between terminals in a cartridge of low loss dielectric.

ower Supply: None required.

requency Range: Determined by the barretter mount.

ower Rating: 14.4 to 16.0 milliwatts total normal input; approximately 32.5 milliwatts maximum safe power.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14. 3. 3	

project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

BARRETTER
MODEL NO. 821
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Current Rating: 8.75 ±2.25 milliamperes for 200 ohms at 25° C.; approximately 10.8 milliamperes maximum safe current.

Resistance: 200 ohms normal operating resistance at 25° C. ambient temperature.

Average Sensitivity: 4.5 ohms per milliwatt for 200-ohm initial condition at 25° C.

Life Rating: Over 4000 hours for continuous normal input power.

Mechanical Ruggedness: Passes Navy shock and vibration test No. RE-13A-554E.

Tropicalization: Fungus and moisture proof.

Ambient Temperature Range: -40° C. to +80° C.

Square-Law Response Error: Less than 1% for input power of 200 microwatts above bias level.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sperry Gyroscope Company, Inc., Great Neck, Long Island, New York; Approximate Cost per Unit, $12.00, 25 May 1953.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog "Microline Instruments", Publication No. 23-30.

SHIPPING DATA:

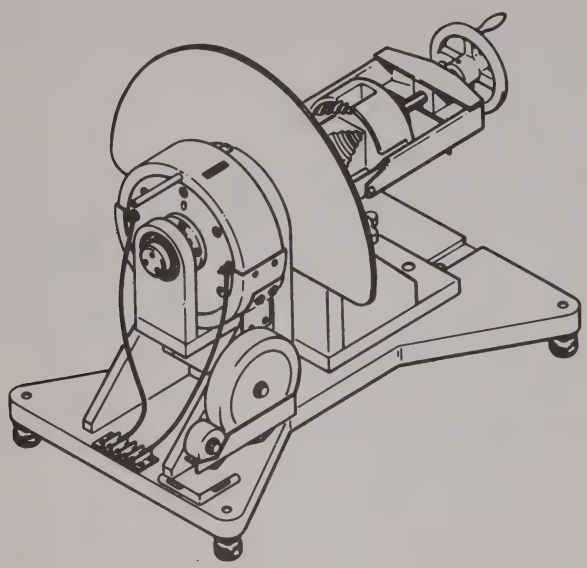
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Barretter Model No. 821			4/5 long	1/5 dia.		

14.4 ELECTROMECHANICAL POWER MEASURING EQUIPMENT

DYNAMOMETER-MOTOR TEST
MODEL UED6-1-1
(Airesearch Manufacturing Division, Garrett Corporation)



FUNCTIONAL DESCRIPTION:

A general purpose equipment used to test and calibrate the torque of electric motors. The instrument is capable of measuring rated load, stalled load and brake torques of low inertia electric motors. Test results are indicated in ounce-inches.

RELATIONSHIP TO OTHER EQUIPMENT:

Equipment required but not supplied includes Electrical Test Panel Airesearch No. 257916, 0 to 25 amps and Airesearch No. 253678, 25 to 200 amps.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The test set consists basically of a motor, a mounting fixture for the motor under test and a torque indicator.

Power Supply: 28 volts, DC.

Torque Testing Range: 0 to 300 and 0 to 600 ounce-inches.

Accuracy: ±1% of scale calibrated in 1.0 ounce-inch increments.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			Standard
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.:	
F.I.I.N.: 6625-031-7025		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment - Airesearch UED6-1-1			

DYNAMOMETER-MOTOR TEST
MODEL UED6-1-1
(Airesearch Manufacturing Division, Garrett Corporation)

MANUFACTURERS' OR CONTRACTORS' DATA:
Airesearch Manufacturing Division, Garrett Corporation, 9851 Sepulveda, Los Angeles 45, California.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
TO 33A3-4-11-31 (Operation and Service Instructions).

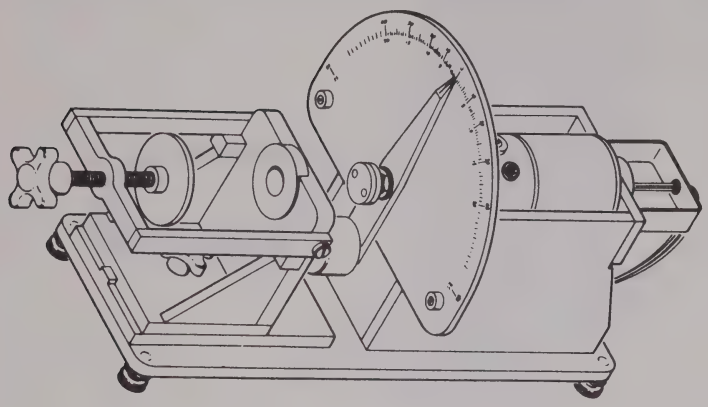
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer-Motor Test Airesearch UED6-1-1	metal		22	16	19	107

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer-Motor Test Airesearch UED6-1-1					

DYNAMOMETER
MODEL UMTD1-1-1
(Airesearch Manufacturing Division, Garrett Corporation)



FUNCTIONAL DESCRIPTION:

A general purpose equipment used to test and calibrate the torque of electric motors. The instrument is capable of measuring the rated load, stalled load and brake torques of low-torque electric motors. Test results are indicated in ounce-inches.

RELATIONSHIP TO OTHER EQUIPMENT:

Equipment required but not supplied includes Electrical Test Panel Airesearch, 0 to 5, 2 and 50 amps, AC and DC; Electrical Power Test Set, 0 to 1.0, 5 and 10 amps, DC; Rotary Actuator Test Holder; and Motor to Dynamotor Adapter.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The test set consists basically of a motor, a mounting fixture for the motor under test and a torque indicator.

Power Supply: 28 volts, DC, 2.0 amps.

Torque Testing Range: 0 to 25 and 0 to 50 ounce-inches.

Accuracy: ±1% of scale calibrated in 1.0 ounce-inch increments.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			Standard
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.:	
F.I.I.N.: 6635-345-3567		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment - Airesearch UMTD1-1-1			

DYNAMOMETER
MODEL UMTD1-1-1
(Airesearch Manufacturing Division, Garrett Corporation)

MANUFACTURERS' OR CONTRACTORS' DATA:

Airesearch Manufacturing Division, Garrett Corporation, 9851 Sepulveda, Los Angeles 45, California.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

TO 33A3-4-11-31 (Operation and Service Instructions). TO 33A3-4-11-13 (Overhaul Instructions).

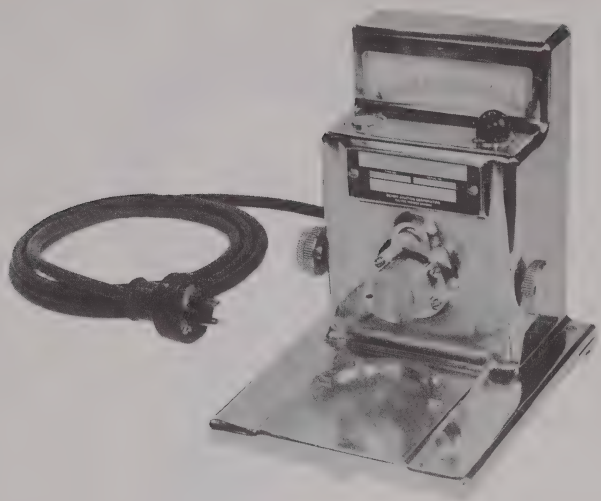
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer Airesearch UMTD1-1-1	metal		31	11	12	45

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer Airesearch UMTD1-1-1					

TESTER
Part No. 13716-1-A
(Eclipse-Pioneer Division)



FUNCTIONAL DESCRIPTION:

This instrument is used in testing the starting torque of instrument ball bearings. The tester is housed in a case with the control knobs located at front and sides. An external air source provides air to the tester which meters and directs this air out through an air jet assembly and against the knurled ring of the bearing test rotor. The rotor secures and aligns the bearing to be tested. A guide strip on the tester properly positions the test rotor against the air jet assembly to produce an accurate air gap between jet and outside diameter of the rotor. A bubble type level on the instrument shows when the support platform is level. Leveling is accomplished with the aid of two screws at the rear of the tester.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: An air pressure indicator dial is incorporated in the device to indicate the bearing reject point. A red lamp on the panel is adjusted to light when the pressure indicator reads "4." This is the normal reject point setting. The red light permits rapid production type testing of bearings.

The metering valve on the left side of the housing can be adjusted to produce

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-802384	R88TO950-010-000	
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment -			E.-P. 13716-1-A

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A

TESTER
Part No. 13716-1-A
(Eclipse-Pioneer Division)

ELECTROMECHANICAL DESCRIPTION: (Continued)

the desired pressure indicator reading for any air jet force. The control valve on the right side regulates the air pressure. The air jet assembly may be turned 180 degrees in order to reverse the direction of the test rotor.

The tester is calibrated before the test by means of a QB 72218 Calibrator of the desired torque value.

Power Supply: 110 volts, AC, 60 cycles per second, single-phase.
Pressure Indicator Dial: 0 to 8 units.
Test Bearing Diameter (OD): 3/16 inch to 1-3/16 inches inclusive.
Starting Friction Range: 0.02 to 1.5 GM. CM.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, Teterboro, New Jersey.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

"Eclipse-Pioneer Service Test Equipment No. S1-13716."
Eclipse-Pioneer Division Publication.

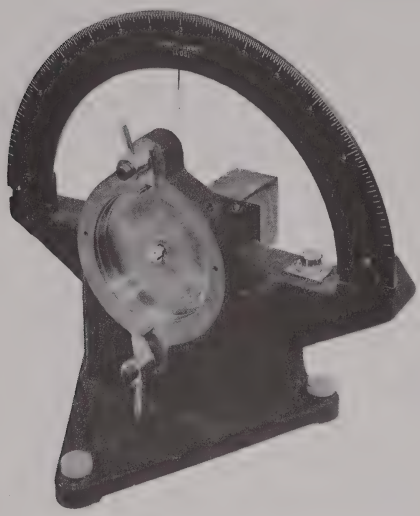
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Tester (Eclipse-Pioneer 13716-1-A)	1.04	15	10	12	17

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Tester (Eclipse-Pioneer 13716-1-A)	Bronze	7CAD-802384 R88TO950-010-000	6-5/16	6-3/16	5-1/4	8-1/2

DYNAMOMETER
Part No. 13751-1-A
(Eclipse-Pioneer Division of
Bendix Aviation Corporation)



FUNCTIONAL DESCRIPTION:

This dynamometer is designed for testing motors having torque values of less than 0.6 ounce-inches. Motors with either clockwise or counterclockwise rotation can be tested. The dynamometer is designed to be used in conjunction with Eclipse-Pioneer Control type 13739-1-A. In the test, the dynamometer rotor opposes the rotation of the motor under test.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Description: The dynamometer consists of a two-phase induction motor mounted in a cast cradle on two ball bearings. The motor is aligned with the center of a mounting pad machined on the vertical face of the cradle. The pad accommodates the motor to be tested. The motor of the dynamometer is free to swing in the cradle.

A pointer and calibrated weight is attached to the stator housing and sweeps a torque scale graduated in ounce-inches that is attached to the cradle.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-276493-135		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
	- Electronics Test Equipment -		E.-P. 13751-1-A

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A

DYNAMOMETER
Part No. 13751-1-A
(Eclipse-Pioneer Division of
Bendix Aviation Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

One end of the motor shaft has coupling provisions for engaging the shaft of the motor to be tested. The other end of the motor shaft is fitted with a strobo disc for rpm counting.

A mirror assembly is attached to the cradle at an angle which will reflect the dot on the strobo disc making it visible from a front position.

Power Supply: Power is derived from the control panel.
Torque Testing Range: 0.1 to 0.6 ounce-inch.
Test Motor Speed: Up to 10,000 rpm.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, 43 Williams Avenue, Teterboro, New Jersey; Contract No. AF 33(600)23719.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Eclipse-Pioneer Publication No. S1-13751, "Service Test Equipment."

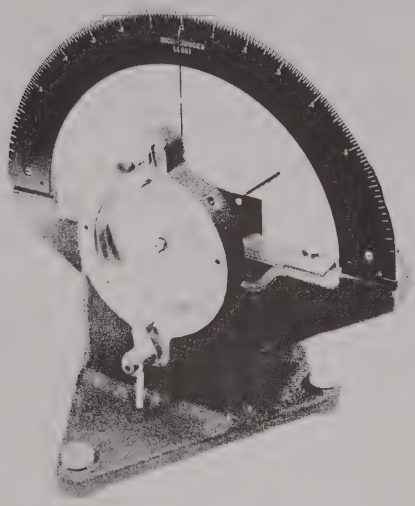
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer (Eclipse-Pioneer 13751-1-A)		7CAD-276493-135	11	12	10	

DYNAMOMETER
Part No. 13751-2-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)



UNCTIONAL DESCRIPTION:

A portable, general purpose dynamometer designed for testing motors having orque values of less than 2.5 ounce-inches. Motors with either clockwise or ounterclockwise rotation may be tested. The dynamometer provides a load to he unit under test by opposing motor rotation.

ELATIONSHIP TO OTHER EQUIPMENT:

Used in conjunction with Eclipse-Pioneer Dynamometer Control 13739-1-A.

LECTROMECHANICAL DESCRIPTION:

Circuit Information: The dynamometer essentially consists of a two-phase induction motor mounted on two ball bearings and housed in a cast metal cradle. The motor is aligned with the center of a mounting pad machined on the vertical face of the cradle. The pad accommodates the motor under test. The motor of the dynamometer is free to swing in the cradle. A pointer and calibrated weight assembly is attached to the stator housing and, during tests, the pointer

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.		(ASO)R88TO950-147-000	
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.I.N.: 6625-303-9655		FUNCTIONAL CLASS. NO.: 14.4.2	

DYNAMOMETER
Part No. 13751-2-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

sweeps a torque scale attached to the cradle. One end of the motor shaft has coupling provisions for engaging the shaft of the motor under test. The other end of the motor shaft is fitted with a strobo disc for determining revolutions per minute. A mirror assembly is attached to the cradle in such a manner that a dot of light is reflected on the strobo disc, providing indications visible from the front panel.

Power Supply: 115 volts, AC, 400 cycles per second, 8 amps; 28 volts, DC, 10 amps.

Torque Testing Range: 0 to 2.5 ounce-inches in 0.02 increments.

Test Motor Speed: To 10,000 revolutions per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, 43 Williams Avenue, Teterboro, New Jersey; Contract No. N383-45442A; Approximate Cost per Unit, $838.65.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

NavAer 17-15C-513 Operation and Service Instructions with Illustrated Parts Breakdown and Wiring Diagram.

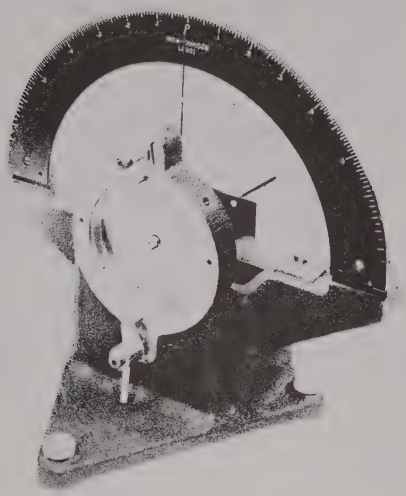
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer Eclipse-Pioneer 13751-2-A			11	12	10	15

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer Eclipse-Pioneer 13751-2-A					

DYNAMOMETER
Part No. 13751-3-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)



FUNCTIONAL DESCRIPTION:

A portable, general purpose dynamometer designed for testing motors having torque values of less than 12.5 ounce-inches. Motors with either clockwise or counterclockwise rotation may be tested. The dynamometer provides a load to the unit under test by opposing motor rotation.

RELATIONSHIP TO OTHER EQUIPMENT:

Used in conjunction with Eclipse-Pioneer Dynamometer Control 13739-1-A.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The dynamometer essentially consists of a two-phase induction motor mounted on two ball bearings in a cast metal cradle. The motor is aligned with the center of a mounting pad machined on the vertical face of the cradle. The pad accommodates the motor under test. The motor of the dynamometer is free to swing in the cradle. A pointer and calibrated weight assembly is attached to the stator housing and, during tests, the pointer sweeps

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.		(ASO)R88TO950-148-000	
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.: 6625-303-9656		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment - E.-P. 13751-3-A			

DYNAMOMETER
Part No. 13751-3-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

a torque scale that is attached to the cradle. One end of the motor shaft has coupling provisions for engaging the shaft of the motor under test. The other end of the motor shaft is fitted with a strobo disc for determining revolutions per minute. A mirror assembly is attached to the cradle in such a manner that a dot of light is reflected on the strobo disc, providing indications visible from the front panel.

Power Supply: 115 volts, AC, 400 cycles per second, 2-phase; 28 volts, DC, 10 amps.

Torque Testing Range: 0 to 12.5 ounce-inches in 0.1 increments.

Test Motor Speed: To 10,000 revolutions per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, 43 Williams Avenue, Teterboro, New Jersey; Contract No. N383-45442A; Approximate Cost per Unit, $887.24.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

NavAer 17-15C-513 Operation and Service Instructions with Illustrated Parts Breakdown and Wiring Diagram.

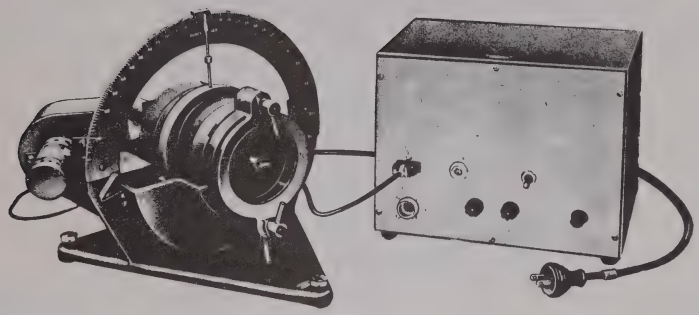
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer Eclipse-Pioneer 13751-3-A			12	15	15	30

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer, Eclipse-Pioneer 13751-3-A					

DYNAMOMETER
Part No. 13751-4-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)



FUNCTIONAL DESCRIPTION:

A portable, general purpose dynamometer designed for testing motors having torque values of less than 62.5 ounce-inches. Motors with either clockwise or counterclockwise rotation may be tested. The dynamometer provides a load to the unit under test by opposing motor rotation.

RELATIONSHIP TO OTHER EQUIPMENT:

Used in conjunction with Eclipse-Pioneer Dynamometer Control 13739-1-A.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The dynamometer essentially consists of a two-phase induction motor mounted on two ball bearings and housed in a cast metal cradle. The motor is aligned with the center of a mounting pad machined on the vertical face of the cradle. The pad accommodates the motor under test. The motor of the dynamometer is free to swing in the cradle. A pointer and calibrated weight

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.		(ASO)R88TO950-149-000	
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.I.N.: 6625-303-9657		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment - E.-P. 13751-4-A			

DYNAMOMETER
Part No. 13751-4-A
(Eclipse-Pioneer Division of Bendix Aviation Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

assembly is attached to the stator housing and during tests the pointer sweeps a torque scale attached to the cradle. One end of the motor shaft has coupling provisions for engaging the shaft of the motor under test. The other end of the motor shaft is fitted with a strobo disc for determining revolutions per minute. A mirror assembly is attached to the cradle in such a manner that a dot of light is reflected on the strobo disc providing indications visible from the front panel.

Power Supply: 115 volts, AC, 400 cycles per second, 2-phase, 8 amps, 115 volts, AC, 60 cycles per second, single-phase; 28 volts, DC, 10 amps.

Torque Testing Range: 0 to 62.5 ounce-inches in 0.5 increments.

Test Motor Speed: Up to 10,000 revolutions per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, 43 Williams Avenue, Teterboro, New Jersey; Contract No. N383-45442A; Approximate Cost per Unit, $1,585.55.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

NavAer 17-15C-513 Operation and Service Instructions with Illustrated Parts Breakdown and Wiring Diagram.

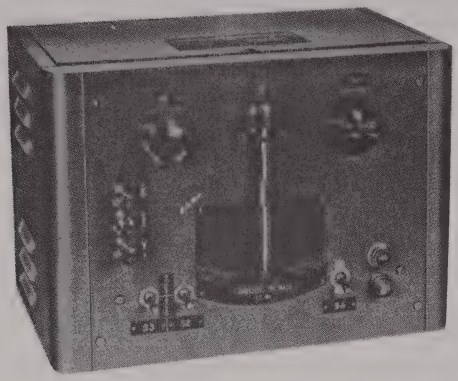
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer Eclipse-Pioneer 13751-4-A			12	16	16	40
1	Power Supply			8-3/4	11-3/4	8-1/4	11

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer Eclipse-Pioneer 13751-4-A					

TESTER, AMPLIFIER
Part No. NSA-1
(Ford Instrument Company)



FUNCTIONAL DESCRIPTION:

This is a portable instrument designed to test the latitude rate servo amplifier, the longitude rate servo amplifier, and the C.T. servo amplifiers of the Amplifier, Electronic Control AM-916/ASN-6, which is part of Computer Set, Latitude and Longitude AN/ASN-6.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The tester instrument panel contains a torque scale with a pointer connected to a torque motor in the chassis of the tester. This motor is a servo motor of the same type as the motor that is energized by the servo amplifier while in operation. Current from the servo amplifier under test energizes the motor which then swings a weighted indicator to a position on the torque scale. The scale indicates in ounce-inches the stalled motor-torque output of the amplifier. The tester also permits the introduction of a measured error-signal voltage into the servo amplifier under test, and delivers the output voltage of the amplifier to an external auxiliary meter or oscilloscope. A potentiometer permits the test voltage to be varied and selector switches on the panel permit selection of the error-signal circuits.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-801962		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment -			Ford Inst, NSA-1

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

TESTER, AMPLIFIER
Part No. NSA-1
(Ford Instrument Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Power Supply: 115 volts, AC, 400 cycles per second, single-phase; 250 volts, DC, regulated.

MANUFACTURERS' OR CONTRACTORS' DATA:

Ford Instrument Company, Division of the Sperry-Rand Corporation, 31-10 Thomson Avenue, Long Island City, New York; Contracts AF33(600)18882 and AF33(600) 26828.

TUBE COMPLEMENT:

1 JAN-OA2.

REFERENCE DATA AND LITERATURE:

TO 33D2-8-18-31 (Operation, Service and Repair Instructions).

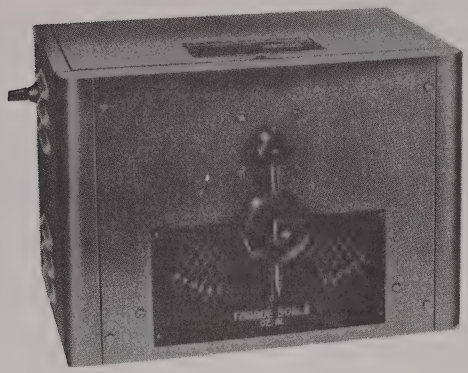
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Tester, Amplifier (Ford Inst. NSA-1)		7CAC-801962	8-1/2	12-1/8	8	15-1/4

TESTER, TIME AMPLIFIER
Part No. NSA-3
(Ford Instrument Company)



FUNCTIONAL DESCRIPTION:

This is a test instrument designed to measure the stalled motor-torque output of the time amplifier in the Amplifier, Electronic Control AM-916/ASN-6, which is part of Computer Set, Latitude and Longitude AN/ASN-6. This tester also permits measuring the error of the time amplifier frequency standard.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The tester provides AC and DC operating voltages to the amplifier. The tester panel contains a torque scale calibrated in ounce-inches. The amplifier under test energizes a servomotor in the tester which drives a weighted indicator across the torque scale on the panel. The servo motor in the tester is similar to that which the time amplifier energizes in the electronic control amplifier. An auxiliary oscilloscope is used in the frequency standard check. The vertical amplifier of the oscilloscope is connected to a test point on the time amplifier, and the horizontal amplifier is connected to an external frequency standard of 400 cycles per second. Rotation time for the oscilloscope pattern is then measured to determine whether the time amplifier frequency standard is operating below its maximum allowable error.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-812202		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
	- Electronics Test Equipment -		Ford Inst. NSA-3

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

TESTER, TIME AMPLIFIER
Part No. NSA-3
(Ford Instrument Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Torque Scale Range: 0 to 12 ounce-inches.

Maximum Allowable Frequency Error: 200 parts per million.

Power Supply: 6.3 volts, AC, 400 cycles per second, single-phase; 250 volts, DC, regulated.

MANUFACTURERS' OR CONTRACTORS' DATA:

Ford Instrument Company, Division of the Sperry-Rand Corporation, 31-10 Thomson Avenue, Long Island City, New York; Contracts AF 33(600)1882 and AF 33(600)-26828.

TUBE COMPLEMENT:

1 JAN-OA2.

REFERENCE DATA AND LITERATURE:

TO 33D2-8-18-31 (Operation, Service and Repair Instructions).

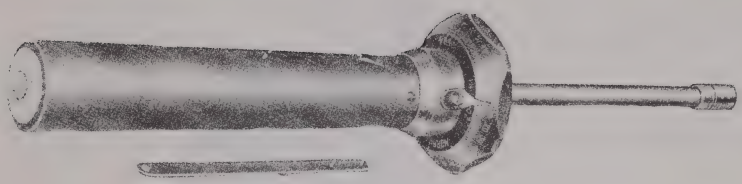
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Tester, Time Amplifier (Ford Inst. NSA-3)		7CAC-812292	11-1/2	12-1/8	8	10

TORQUE INDICATOR
Part No. 7707034G1
(General Electric Company)



FUNCTIONAL DESCRIPTION:

A portable instrument which is used to measure the break-away torque of the clutches on the antenna azimuth and elevation drive motors. A pointer attached to the indicator handle indicates the amount of torque applied to a fixed point. The tool can measure either clockwise or counter-clockwise torque ranging from 0 to 80 inch-ounces.

RELATIONSHIP TO OTHER EQUIPMENT:

MECHANICAL DESCRIPTION:

Physical Characteristics: The indicator consists of a hollow tubular wrench which houses a calibrated ground steel helical spring. One end of the spring is attached to the inside end of the wrench, while the opposite end is attached to a calibrated dial. An adapter snaps into the dial-end of the wrench and a standard socket fits on the adapter. When the socket is applied to the fixed shaft of a drive motor and

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	9CGE-C7707034		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment -			G.E. 7707034G1

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

TORQUE INDICATOR
Part No. 7707034G1
(General Electric Company)

MECHANICAL DESCRIPTION: (Continued)
the wrench handle turned, a pointed indicates the amount of torque required for clutch break-away.

MANUFACTURERS' OR CONTRACTORS' DATA:
General Electric Company, 1 River Road, Schenectady, New York.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
TO 33D5-5-94-1 (Operation and Service Instructions)

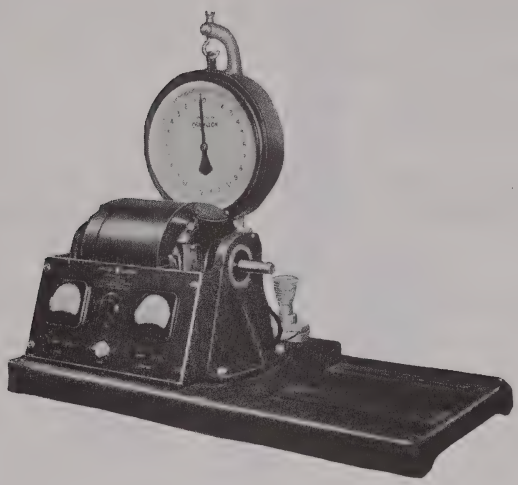
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Torque Indicator G. E. C7707034G1	Metal	9CGE-C7707034G1				
1	Carrying Case						
1	Standard Socket						
1	Adapter						
1	Spanner Wrench						

DYNAMOMETER
Part No. 9742799G-2
(General Electric Company)



FUNCTIONAL DESCRIPTION:

An equipment used for analyzing and observing the operation of fractional horsepower motors, generators, and dynamometers. The equipment can also be used for testing internal combustion engines and other mechanical equipment of similiar rating. Specific tests which this equipment performs include checking the power requirements of small machines such as fans, pumps, and compressors, and obtaining performance curves on small motors and generators. Test results are indicated graphically on a calibrated chart.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: Absorption resistors are integral with the dynamometer.
Power Supply: 115 volts DC.
Generator Absorption: 1 horsepower continuous.
Motor Rating: 3/4 horsepower at 2000 revolutions per minute.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
- Electronics Test Equipment - G.E. 9742799G-2			

DYNAMOMETER
Part No. 9742799G-2
(General Electric Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Maximum Field Current: 0.25 amp.
Scale Rating: 12.5 to 0 to 12.5 pounds.
Scale Accuracy: 3/4 ounce maximum.
Speed: 4000 revolutions per minute.
Ammeter Scale: 0 to 10 amps.
Voltmeter: 0 to 150 volts DC.

MANUFACTURERS' OR CONTRACTORS' DATA:
General Electric Company, River Road, Schenectady, New York; Approximate Cost per Unit, $475.00.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
General Electric Company Publication 635.

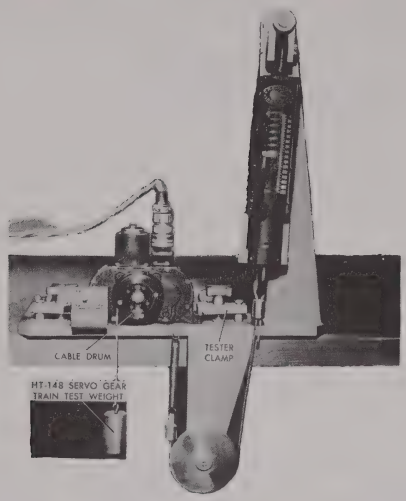
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Dynamometer General Electric 9742799G-2			30	17	23	160

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Dynamometer General Electric 9742799G-2					

SERVO TORQUE TESTER
Model No. HT142
(Minneapolis-Honeywell Regulator Company)



FUNCTIONAL DESCRIPTION:

A special purpose unit for testing the torque of the MG7001A Servo.

RELATIONSHIP TO OTHER EQUIPMENT:

Used in conjunction with the HT117 Pulse Generator, the HT164 Pulley, and the HT169 Weight for torque testing the MG7001A Servo.

MECHANICAL DESCRIPTION:

Physical Description: The servo to be tested is clamped in the tester, and the cable drum is replaced by a calibrated pulley. The pointer on the tester is adjusted so that drum rotation (indicated on the calibrated pulley) may be determined.

A pulse generator is attached to the servo, and a weight is added to the test pulley cable. The pulse generator supplies pulses of 0.013 or 0.030 seconds to the servo, and pulley rotation is read. For continuous maximum torque reading the weight is removed and the pulley cable is attached to the spring scale.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	
	- Electronics Test Equipment -		M. Honeywell HT142

s project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

SERVO TORQUE TESTER
Model No. HT142
(Minneapolis-Honeywell Regulator Company)

MANUFACTURERS' OR CONTRACTORS' DATA:
Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota.

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog, Form ADT-137.

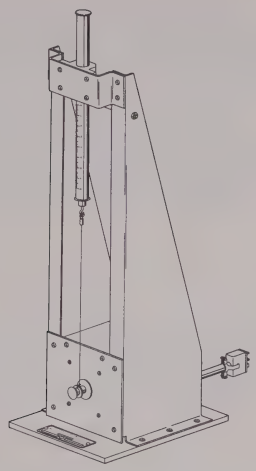
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Servo Torque Tester Minneapolis-Honeywell HT142					

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Servo Torque Tester Minneapolis-Honeywell HT142						

FIXTURE, TEST, AMPLIFIER TORQUE MOTOR
Part No. T-101287
(Sperry Gyroscope Company)



FUNCTIONAL DESCRIPTION:

This is a special purpose test item used in measuring the torque output characteristics of the types LH and MH amplifiers. These amplifiers are component parts of the stabilization amplifier which is used in various Bombing Navigational Systems. This test instrument is used with either of T-101271 or T-101272, Amplifier Aging Testing Fixtures. The torque readings are taken directly from a push-pull gage scale.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: This fixture consists of a base plate and supporting frame, a two-winding servo motor and pulley, a push-pull gage and interconnecting cable. The gauge mounted at the upper part of the frame is connected to the motor pulley by a torque cord. The amplifier output is applied to one winding of the torque motor and an out of phase 115 volts 400 cycle reference voltage is applied to the other winding. The motor rotates and produces a torque proportional to the signal from the amplifier. When the load imposed by the gauge spring causes the motor to stall, the scale reading obtained is an indication of the torque output of the amplifier.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-801315-65		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 14.4.2	

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

FIXTURE, TEST, AMPLIFIER TORQUE MOTOR
Part No. T-101287
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: Power is obtained from the unit under test.
Gage Scale Calibration: 0 to 8 ounces in increments of 0.1 ounce.

MANUFACTURERS' OR CONTRACTORS' DATA:
Sperry Gyroscope Company, Division of the Sperry-Rand Corporation, Great Neck, Long Island, New York; Contract AF33(600)6565.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
TO 33D5-2-5-11 (Operation Instructions).
TO 33D5-2-5-12 (Handbook Service Instructions).

SHIPPING DATA:

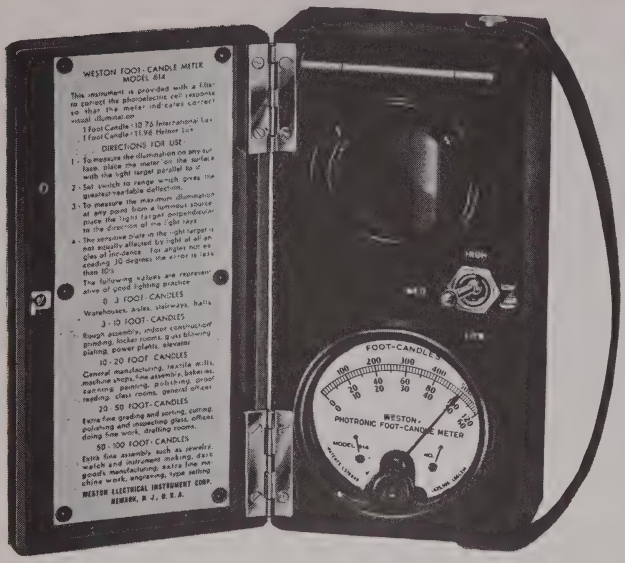
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Test, Amplifier Torque Motor (Sperry T-101287)		7CAC-801315-65	23	6-1/2	8	
1	Interconnecting Cable (Sperry T-101287-802)						

14.5 ENERGY MEASURING EQUIPMENT

FOOT-CANDLE METER
MODEL 614
(Weston Electrical Instruments, Division of Daystrom, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure light intensity. The meter may be employed for general lighting surveys and tests requiring a wide measurement range. Test results are indicated directly in foot-candles.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument essentially consists of a light sensitive cell used to transform light energy into electrical energy, a range selector circuit and a metering circuit. The photocell is mounted on hinges to increase instrument versatility. The range switch provides three light sensitivity ranges. Light directed to the photocell through a transparent window produces a photocell current proportional to the light energy. The photocell current is monitored by means of an ammeter calibrated in terms of light intensity.

Power Supply: None.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			Standard
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: Commercial	
F.I.I.N.: 6695-254-8929		FUNCTIONAL CLASS. NO.: 14.5	

FOOT-CANDLE METER
MODEL 614
(Weston Electrical Instruments, Division of Daystrom, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Range: 0 to 100, 250 and 500 foot-candles with cosine and color filters; 0 to 60, 120 and 600 foot-candles with color filter.

MANUFACTURERS' OR CONTRACTORS' DATA:
Weston Electrical Instruments, Division of Daystrom, Incorporated, 614 Frelinghuysen Avenue, Newark 12, New Jersey; Contract No. 33(604)21175; Approximate Cost per Unit, $113.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Foot-Candle Meter, Weston 614	metal		8	4	3	3

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Foot-Candle Meter Weston 614					

SIGHTMETER
MODEL 703 Type 7
(Weston Instruments, Division of Daystrom, Incorporated)

FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure light. The instrument is primarily used where measurements are conducted to determine the lighting conditions in personnel working areas. The unit is also used to measure "black light" of material inspection equipments. Test results are indicated directly in foot-candles.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument basically consists of a light sensitive cell used to transform light energy into electrical energy and a metering circuit. Light directed to the photocell through a transparent window produces a photocell current proportional to the light energy. The photocell current is monitored by means of an ammeter calibrated in terms of light intensity. The photocell is supplied with a cosine filter for directivity and a color correction filter for different types of lighting systems. (Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			Standard
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: Commercial	
F.I.I.N.: 6695-536-9244		FUNCTIONAL CLASS. NO.: 14.5	

SIGHTMETER
MODEL 703 Type 7
(Weston Instruments, Division of Daystrom, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Power Supply: None.
Range: 0 to 100 foot-candles.

MANUFACTURERS' OR CONTRACTORS' DATA:
Weston Electrical Instruments, Division of Daystrom, Incorporated, 614 Frelinghuysen Avenue, Newark 12, New Jersey; Approximate Cost per Unit, $53.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Sightmeter Weston 703 Type 7	metal		4-5/8	2-5/8	1-3/4	2

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Sightmeter, Weston 703 Type 7					

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 15

TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

15

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 15

TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

15

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

15. TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

15.1 Liquid and Bimetallic Thermometer

15.2 Pyrometer

15.3 Temperature Recording Equipment

15. TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

A device designed to detect, measure, and/or record temperatures or changes in temperatures.

15.1 LIQUID AND BIMETALLIC THERMOMETER

A device in which the expansion or contraction due to temperature change of a liquid or a metallic solid indicates on a calibrated scale the temperature of the surrounding medium.

15.2 PYROMETER

A device designed to measure temperatures by means of changes in electrical resistance, the production of thermoelectric currents, the expansion of gases, or the specific heat of solids.

15.3 TEMPERATURE RECORDING EQUIPMENT

A device designed to make a continuous record of temperature variations over a period of time.

TABLE OF CONTENTS

Functional Classification		Designation	Name	
15.	TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT			
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	15.2	Minneapolis-Honeywell Y156X63P24-X-(L)	Pyrometer	227

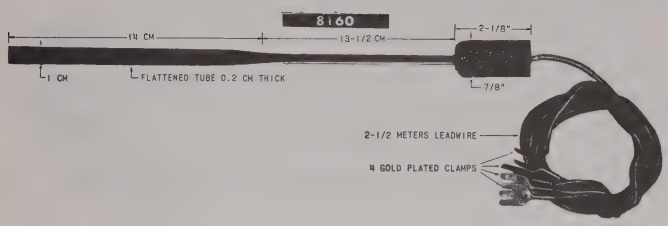
ALPHA-NUMERICAL INDEX

Designation	Name	Functional Classification
Leeds and Northrup 8160	Platinum Resistance Thermometer	15. 1
Leeds and Northrup 8163	Platinum Resistance Thermometer	15. 1
Leeds and Northrup 8658	Pyrometer	15. 2
Minneapolis-Honeywell Y 156X63P24-X-(L)	Pyrometer	15. 2
Taylor 21009	Thermometer Set	15. 1
Taylor 21019	Thermometer Set	15. 1
Weston 2261	Thermometer	15. 1

15. TEMPERATURE INDICATING, MEASURING, AND RECORDING EQUIPMENT

15.1 LIQUID AND BIMETALLIC THERMOMETERS

PLATINUM RESISTANCE THERMOMETER
MODEL 8160
(Leeds and Northrup Company)



FUNCTIONAL DESCRIPTION:

A portable, general purpose thermometer used to make precise temperature measurements over a limited range. The thermometer employs a thin element flattened at one end to permit insertion into narrow spaces.

RELATIONSHIP TO OTHER EQUIPMENT:

Used in conjunction with the Mueller Bridge Leeds and Northrup Type G.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The element consists of a bifilar winding of platinum wire wound on a flat mica strip sealed in dry air within a flat, copper-nickel alloy tube. The element is annealed to minimize effects of internal strain. The resistance of the winding is approximately 25 ohms, variable with changes in temperature. A calibrated resistance measuring instrument is used to interpret resistance fluctuations in terms of temperature. Connections to the resistance measuring instrument are by means of a four-wire cable terminated

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Substitute Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
C.I.I.N.:		FUNCTIONAL CLASS. NO.: 15.1	

PLATINUM RESISTANCE THERMOMETER
MODEL 8160
(Leeds and Northrup Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

with four gold plated spade lugs.
Power Supply: None.
Temperature Range: -40 to +100°C.
Accuracy: ±0.01°C when used with Leeds and Northrup G-2 Muller Bridge.
Resistance of Winding: 25.5 ohms at 0°C (approximate).
Sensitivity: 0.1 ohm per °C (approximate).

MANUFACTURERS' OR CONTRACTORS' DATA:

Leeds and Northrup Company, 4901 Stenton Avenue, Philadelphia 44, Pennsylvania; Approximate Cost per Unit, $263.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

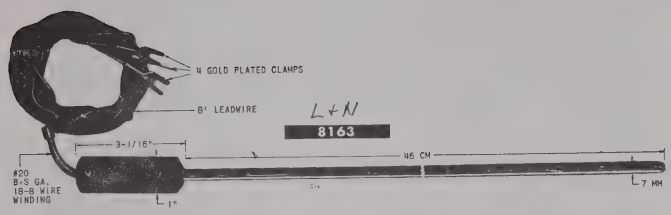
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Platinum Resistance Thermometer Leeds and Northrup 8160						0.1

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Platinum Resistance Thermometer Leeds and Northrup 8160					

PLATINUM RESISTANCE THERMOMETER
MODEL 8163
(Leeds and Northrup Company)



FUNCTIONAL DESCRIPTION:

A portable, general purpose, laboratory-type resistance thermometer designed to make precise temperature measurements. The unit is used with a resistance bridge to interpret resistance fluctuations in terms of temperature.

RELATIONSHIP TO OTHER EQUIPMENT:

Used with Leeds and Northrup Type G Mueller Bridge.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The element consists of a Pyrex glass tube containing a temperature-sensitive platinum annealed winding. Expansion or contraction of the temperature-sensitive portion is compensated for by means of spring-like coils. The annealing minimizes effects of internal and external strain. The resistance of the winding is approximately 25 ohms, variable with changes in temperature. Temperature indications are obtained by measuring the thermometer resistance with the associated bridge. Connection to the resistance measuring bridge is

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Substitute Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 15.1	
- Electronics Test Equipment - Leeds & Northrup 8163			

PLATINUM RESISTANCE THERMOMETER
MODEL 8163
(Leeds and Northrup Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

by means of a four-wire cable terminated with four gold plated spade lugs.
Power Supply: None.
Temperature Range: -190 to +500°C.
Accuracy: ±0.01°C when used with the Leeds and Northrup G-2 Mueller Bridge.
Resistance: 25.5 ohms at 0°C, approximately.
Sensitivity: 0.1 ohm per °C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Leeds and Northrup Company, 4901 Stenton Avenue, Philadelphia 44, Pennsylvania; Approximate Cost per Unit, $389.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Platinum Resistance Thermometer, Leeds and Northrup 8163						0.1

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Platinum Resistance Thermometer, Leeds and Northrup 8163					

THERMOMETER SET
MODEL 21009
(Taylor Instrument Companies)

UNCTIONAL DESCRIPTION:

A portable, general purpose matched set of nine mercury-in-glass thermo-
neters used as laboratory reference standards for accurate temperature meas-
rements. The thermometers are calibrated in degrees Centigrade in accordance
ith the Bureau of Standards and American Society for Testing Materials (ASTM)
ecommended practice. Each thermometer is calibrated to include an auxiliary
cale at the ice point, when not included in the principal range. Temperatures
ay be read to one-tenth of the smallest scale division by means of a correction
hart.

ELATIONSHIP TO OTHER EQUIPMENT:

LECTROMECHANICAL DESCRIPTION:

ower Supply: None.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Substitute Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 15.1	
- Electronics Test Equipment -			Taylor 21009

THERMOMETER SET
MODEL 21009
(Taylor Instrument Companies)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Taylor Model	ASTM Number	Range	Smallest Division
21000	62C-53	-38°C to +2°C	1/10°C
21001	63C-53	-2°C to +32°C	1/10°C
21002	64C-54	+28°C to +52°C	1/10°C
21003	65C-55	+48°C to +77°C	1/10°C
21004	66C-56	+73°C to +102°C	1/10°C
21005	67C-57	+98°C to +155°C	1/5°C
21006	68C-58	+145°C to +205°C	1/5°C
21007	69C-59	+195°C to +305°C	1/2°C
21008	70C-60	+295°C to +405°C	1/2°C

Accuracy: ±0.1 of the smallest scale division.

MANUFACTURERS' OR CONTRACTORS' DATA:
Taylor Instrument Companies, Rochester 1, New York; Approximate Cost per Set, $216.04.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

SHIPPING DATA:

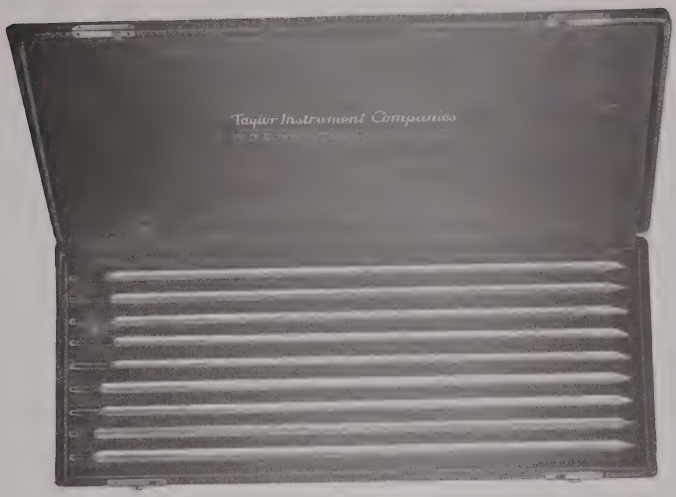
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Thermometer Set Taylor 21009					

THERMOMETER SET
MODEL 21009
(Taylor Instrument Companies)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Thermometer Set Taylor 21009			15 long	0.315 dia.		1
1	Case	wood		1	16	6-1/2	

THERMOMETER SET
MODEL 21019
(Taylor Instrument Companies)



FUNCTIONAL DESCRIPTION:

A portable, general purpose matched set of nine mercury-in-glass thermometers used as laboratory reference standards for accurate temperature measurements. The thermometers are calibrated in degrees Fahrenheit in accordance with the Bureau of Standards and American Society for Testing Materials (ASTM) recommended practice. Each thermometer is calibrated to include an auxiliary scale at the ice point, when not included in the principal range. Temperatures may be read to one-tenth of the smallest scale division by means of a correction chart.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Power Supply: None.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.I.N.:		FUNCTIONAL CLASS. NO.: 15.1	
- Electronics Test Equipment -			Taylor 21019

THERMOMETER SET
MODEL 21019
(Taylor Instrument Companies)

ELECTROMECHANICAL DESCRIPTION: (Continued)

Taylor Model	ASTM Number	Range	Smallest Division
21010	62F-53	-36°F to +35°F	1/5°F
21011	63F-53	+25°F to +85°F	1/5°F
21012	64F-53	+75°F to +130°F	1/5°F
21013	65F-53	+120°F to +175°F	1/5°F
21014	66F-53	+165°F to +220°F	1/5°F
21015	67F-53	+210°F to +310°F	1/2°F
21016	68F-53	+295°F to +400°F	1/2°F
21017	69F-53	+385°F to +580°F	1°F
21018	70F-53	+565°F to +760°F	1°F

Accuracy: ±0.1 of the smallest scale division.

MANUFACTURERS' OR CONTRACTORS' DATA:
Taylor Instrument Companies, Rochester 1, New York; Approximate Cost per Set, $216.04.

TUBE COMPLEMENT:
None.

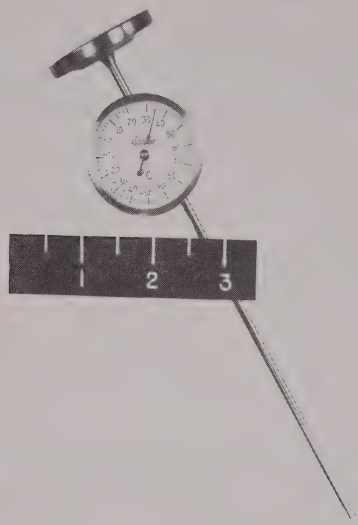
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Thermometer Set Taylor 21019			15 long	0.315 dia.		1
1	Case	wood		1	16	6-1/2	

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Thermistor Set Taylor 21019					

THERMOMETER
MODEL NO. 2261
(Weston Electrical Instrument Corporation)



UNCTIONAL DESCRIPTION:

A portable, general purpose thermometer used in the laboratory for checking ne internal temperature of echo boxes and various other equipments. It is calirated in degrees Centigrade.

ELATIONSHIP TO OTHER EQUIPMENT:

LECTROMECHANICAL DESCRIPTION:

ircuit Information: Uses the bi-metal principle of temperature measurement.
emperature Range: -50° C. to +100° C.
cale Length: 3.40 inches.
cale Division: 2 degrees.
nmersion: Liquids - At least 2 inches.
Gases - At least 4 inches.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAB-838525		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 15.1	
- Electronics Test Equipment -			Weston 2261

project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

THERMOMETER
MODEL NO. 2261
(Weston Electrical Instrument Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Accuracy: Within 0.5% of the range.

MANUFACTURERS' OR CONTRACTORS' DATA:
Weston Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, New Jersey; Approximate Cost per Unit, $7.50, May 1950.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog T-13-C, May 1950.

SHIPPING DATA:

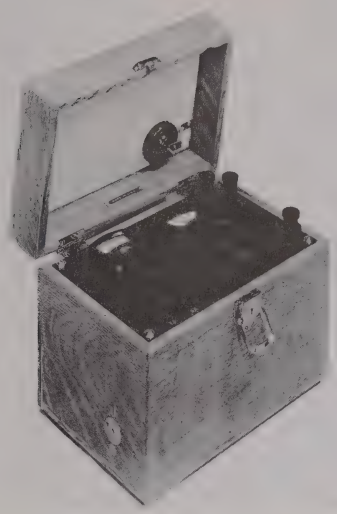
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Thermometer Model 2261	Stain-less steel	7CAB-838525	8.27 long	0.142 stem dia.	1.75 head dia.	0.06

15.2 PYROMETERS

PYROMETER
Model 8658
(Leeds & Northrup Company)



FUNCTIONAL DESCRIPTION:

A portable, self-contained, single range, manually operated temperature indicator. It includes a pointer galvanometer and potentiometer type measuring circuit. The instrument is direct reading in temperature degrees for a particular type of thermocouple.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The circuit consists of a standard potentiometer circuit and a galvanometer. A thermocouple is used in conjunction with the indicator, and the electromotive force developed by the thermocouple is measured by means of the potentiometer circuit using the galvanometer as a null detector. Temperature is read directly on the temperature scale. To assure accuracy, the working current in the potentiometer circuit (voltage drop across a fixed resistor) is manually standardized against an internal standard cell. The instrument is equipped with automatic reference junction compensator. Two keys are provided on the instrument panel for switching the galvanometer to either the standardizing

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-438900		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 15.2	
		- Electronics Test Equipment - Leeds & Northrup 8658	

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

PYROMETER
Model 8658
(Leeds & Northrup Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
(standard cell) or measuring (thermocouple) positions.
Power Supply: None required.
Measuring Scale Ranges: The instrument is supplied in a number of standard ranges up to a maximum of 3000°F or 1600°C.
Accuracy: 0.3% of range when thermal emf is 12 millivolts or more.
Operating Temperature Range: +4°C.(+39°F.) to +40°C.(+104°F.).

MANUFACTURERS' OR CONTRACTORS' DATA:
Leeds & Northrup Company, 4970 Stenton Avenue, Philadelphia 44, Pennsylvania;
Approximate Cost per Unit, $202.00.

REFERENCE DATA AND LITERATURE:
Leeds & Northrup Company Catalog No. ND42.

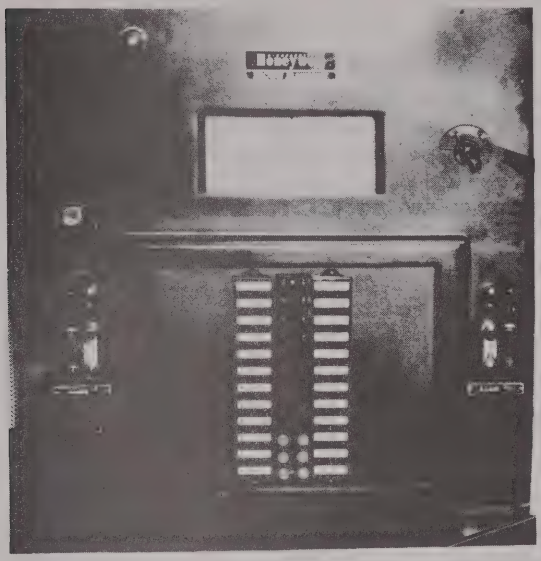
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Pyrometer (Leeds & Northrup 8658)	Wood	7CAD-438900	7-1/4	9-1/2	6-1/4	10

PYROMETER
MODEL Y 156X63P24-X-(L)
(Minneapolis-Honeywell Regulator Company)



UNCTIONAL DESCRIPTION:

A general purpose instrument used as a center from which to measure tempera-ures at twenty-four remote locations. The temperature at any particular location nay be indicated individually at any particular time. Test results are indicated on dual range scale.

ELATIONSHIP TO OTHER EQUIPMENT:

LECTROMECHANICAL DESCRIPTION:

ircuit Information: The pyrometer is comprised of thermocouples used as the temperature sensitive element, a slide wire potentiometer circuit used to produce a voltage equal and opposite to that generated by the monitored thermocouple, and a continuous null balance system employed to indicate temperature. Temperature measurement is accomplished when the automatic null balance circuit detects an unbalanced condition in the potentiometer circuit due to a change in thermocouple temperature. The unbalanced condition is corrected by

(continued)

	AIR FORCE	NAVY	ARMY
YPE CLASS.			
TOCK NOS.	7CAD-672492		
ROCUREM'T INFO.:			
ROCUREM'T COG.:	USAF	DESIGN COG.:	Commercial
.I.I.N.:		FUNCTIONAL CLASS. NO.:	15.2

PYROMETER
MODEL Y 156X63P24-X-(L)
(Minneapolis-Honeywell Regulator Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

the null balance system physically changing the resistance of the slide wire potentiometer until a balanced state is reached. The potentiometer is adjusted by means of a balancing motor which also rotates a temperature calibrated scale. When balance is obtained and the motor comes to rest, a voltage proportional to that required for rebalancing the system is displayed on a dial calibrated in terms of temperature. Standardization of the instrument is accomplished by the use of an integral standard cell. Any one of the twenty-four thermocouples may be monitored by depressing the appropriate switch located on the front panel.

Power Supply: 110 to 125 volts, AC, 50 to 60 cycles per second, 60 watts.

Temperature Measurement Range: 0 to 200°F in 1.0° increments; 0 to 2400°F in 5° increments.

Accuracy: ±0.05%.

Operating Temperature Range: 32° to 110°F.

Standardizing Cell: 1.5 volts, DC type BA-23.

MANUFACTURERS' OR CONTRACTORS' DATA:

Minneapolis-Honeywell Regulator Company, Wayne and Windrim Avenue, Philadelphia 44, Pennsylvania.

TUBE COMPLEMENT:

2 12 AU7, 2 12AX7.

REFERENCE DATA AND LITERATURE:

TO 33D4-6-19-1 (Operation and Service Instructions).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Pyrometer M-H Y 156X63P24-X-(L)					

PYROMETER
MODEL Y 156X63P24-X-(L)
(Minneapolis-Honeywell Regulator Company)

QUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Pyrometer Minneapolis-Honeywell Y 156 X63P24-X-(L)	metal	7CAD-672492	17-27/32	16-3/8	12-11/16	

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 16

STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

16

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 16

STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

16

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

16. STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

- 16.1 Tension and Compression Indicating Equipment
  - 16.1.1 Tensiometer
  - 16.1.2 Compression Indicating Devices
- 16.2 Impact Measuring Device
- 16.3 Hardness Tester
- 16.4 Irregularity Detecting Device
  - 16.4.1 Magnetic Detecting Device
  - 16.4.2 Radiant Energy Detecting Device
    - 16.4.2.1 Flourescent Detecting Device
    - 16.4.2.2 X-ray Detecting Device
    - 16.4.2.3 Ultraviolet Detecting Device
    - 16.4.2.4 Nuclear Detecting Device

16. STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

Equipment designed to measure the restoring force per unit area in an elastic body as it is subjected to external deformation; to measure the degree of deformation of a body; or to indicate surface or volume discontinuities in a body.

16.1 TENSION AND COMPRESSION INDICATING EQUIPMENT

Equipment designed to measure the restoring forces or the degree of extension or compression of an elastic body.

16.1.1 TENSIOMETER

A device for determining the tautness of a supporting wire or cable.

16.1.2 COMPRESSION INDICATING DEVICE

A device designed to determine the degree of compression of an elastic body.

16.2 IMPACT MEASURING DEVICE

A device designed to measure the forces set up when two bodies make forcible contact.

16.3 HARDNESS TESTER

Equipment designed for use in determining the force required to penetrate the surface of a solid.

16.4 IRREGULARITY DETECTING DEVICE

A device designed for use in detecting volume and/or surface discontinuities such as cracks or thin spots in a solid material.

16.4.1 MAGNETIC DETECTING DEVICE

A device designed to detect discontinuity in a ferromagnetic surface by introducing magnetic particles which are attracted to the opposing magnetic poles created at a break in the surface.

16.4.2 RADIANT ENERGY DETECTING DEVICE

A device employing radiant energy to detect surface and/or volume discontinuities in solids.

16.4.2.1 FLUORESCENT DETECTING DEVICE
A device employing a fluorescent liquid to detect surface discontinuities in solids.

16.4.2.2 X-RAY DETECTING DEVICE
A device which employs X-rays to detect surface and volume discontinuities in solids.

16.4.2.3 ULTRAVIOLET DETECTING DEVICE
A device employing ultraviolet rays to detect surface and volume discontinuities in solids.

16.4.2.4 NUCLEAR DETECTING DEVICE
A device employing nuclear energy such as beta rays to detect surface and volume discontinuities in solids.

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Functional Classification	Designation	Name	
16.	STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT		
16.1	TENSION AND COMPRESSION INDICATING EQUIPMENT		
	16.1.1 Wac Engineering C-9	Cable Tensiometer	247

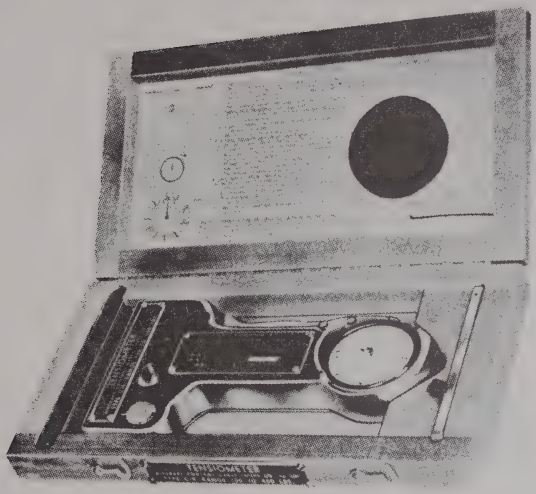
ALPHA-NUMERICAL INDEX

Designation	Name	Functional Classification
Wac Engineering C-9	Cable Tensiometer	16. 1. 1

16. STRESS, STRAIN, AND FLAW DETECTING AND MEASURING EQUIPMENT

16.1 TENSION AND COMPRESSION INDICATING EQUIPMENT

CABLE TENSIOMETER
Type C-9
(Wac Engineering Company)



FUNCTIONAL DESCRIPTION:

A portable, general purpose cable tensiometer designed for determining the tension and diameter of aircraft control cables. Tension is indicated on a dial pointer which may be locked at any indication produced by tension load on the cable, thus permitting removal of the tensiometer from the cable for reading. An indicator is also incorporated on the tensiometer for measuring unknown cable diameters.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument is used by placing the cable under test between two anvils and a plunger preset for the proper size cable and clamping it by means of a lever. Pressure is then applied to the plunger by the tension of the cable under test and measured by the dial indicator mechanically connected to the plunger.

Power Supply: None.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.	7CAD-801160		
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: Commercial	
F.I.I.N.: 6635-530-1129		FUNCTIONAL CLASS. NO.: 16.1.1	

CABLE TENSIOMETER
Type C-9
(Wac Engineering Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Range: 150 to 450 pounds.
Tension Cable Diameters: 1/8, 5/32, 3/16, 7/32 and 1/4 inch.
Accuracy: 3% at temperatures from -65°F to +165°F.

MANUFACTURERS' OR CONTRACTORS' DATA:
Wac Engineering Company (WacLine), Dayton, Ohio.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
T O 33A3-3-101 (Operation and Service Instructions).

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Cable Tensiometer Wac C-9	metal	7CAD-801160				
1	Test Bar 19772						

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Cable Tensiometer Wac C-9					

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 17

GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

17

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 17

GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

17

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2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRONICS TEST EQUIPMENT
FUNCTIONAL CLASSIFICATION

17. GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

- 17.1 Specific Gravity Measuring Device
  - 17.1.1 Hydrometer
- 17.2 Moisture Content Measuring Device
  - 17.2.1 Hygrometer
- 17.3 Manometer
- 17.4 Flow Calibrator and Indicator

17. GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

Equipment designed to measure the physical constants of a liquid or gas, and/or to make qualitative or quantitative analyses of a liquid or gas.

17.1 SPECIFIC GRAVITY MEASURING DEVICE

A device designed to measure the density of a liquid or gas with respect to a reference density.

17.1.1 HYDROMETER

A calibrated float so designed that the liquid displaced by the float indicates directly on the scale the specific gravity of the liquid.

17.2 MOISTURE CONTENT MEASURING DEVICE

A device designed to measure the amount of moisture in a gas.

17.2.1 HYGROMETER

A device designed to measure the relative humidity of the atmosphere.

17.3 MANOMETER

A gage in which the amount of displacement of a column of incompressible liquid indicates the magnitude of the external pressure causing the displacement.

17.4 FLOW CALIBRATOR AND INDICATOR

A device designed to measure the rate of flow of a liquid into a system and/or the total amount of liquid delivered to the system.

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Functional Classification		Designation	Name	
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Designation	Name	Functional Classification
HY-2	Hydrometer	17.1.1
TS-469/U	Hydrometer	17.1.1
Liberty 122	Tester, Fuel Flowmeter	17.4
Meriam A-203	Mercury "30" Manometer	17.3
Meriam 30PA10	Manometer	17.3
Mine Safety Appliance R1	Indicator, Combustible Gas	17
Mine Safety Appliance 3	Explosimeter	17
Potter 6A	Electronic Flowmeter Tachometer	17.4
Wallace and Tiernan FA-145501	Precision Dial Manometer	17
Wallace and Tiernan FA-145511	Precision Dial Manometer	17
Wallace and Tiernan FA-145541	Precision Dial Manometer	17

17. GAS AND/OR LIQUID MEASURING AND ANALYZING EQUIPMENT

INDICATOR, COMBUSTIBLE GAS
MODEL R-1
(Mine Safety Appliances Company)

FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument designed to detect dangerous concentrations of combustible gases or vapors in a confined atmosphere such as in fuel tanks. A meter on the instrument panel indicates the concentration percentage of vapors and gases associated with fuel oils, gasoline, alcohol vapors and hydrogen in mixtures with air or oxygen.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument contains an aspirator bulb and connecting tube used for drawing samples of the atmosphere to be tested. The meter presents indications of combustible gas concentrations of 0 to 120 per cent. The instrument satisfactorily meets all Air Force climatic and environmental extremes, except for temperature operating range.

Power Supply: 1.5 volt, DC.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard		
STOCK NOS.			
PROCUREM'T INFO.:	Spec. MIL-I-9009		
PROCUREM'T COG.:	USAF	DESIGN COG.:	Commercial
C.L.L.N.:	6665-530-0985	FUNCTIONAL CLASS. NO.:	17

INDICATOR, COMBUSTIBLE GAS
MODEL R-1
(Mine Safety Appliances Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Meter Range: 0 to 120% full scale.
Scale Calibration: 24 linear scale divisions; numerals at 0, 20, 40, 60, 80, 120 divisions.
Temperature Range: -40° to +165°F.

MANUFACTURERS' OR CONTRACTORS' DATA:
Mine Safety Appliances Company, Pittsburgh, Pennsylvania.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
TO 11H5-2-3 (Technical Publications).

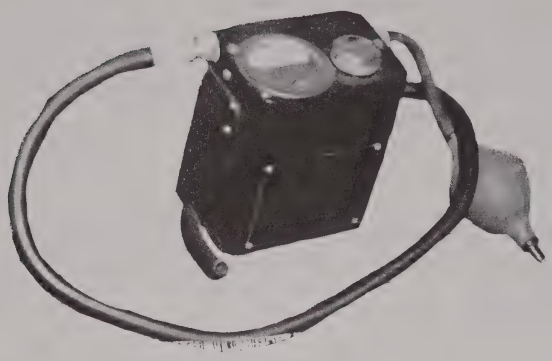
EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Indicator, Combustible Gas Mine R-1	metal		6	3-1/4	5-3/4	4-1/2

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Indicator, Combustible Gas Mine R-1					

EXPLOSIMETER
MODEL 3
(Mine Safety Appliances Company)



UNCTIONAL DESCRIPTION:

A portable, special purpose instrument used to measure the hydrogen content f flammable oxygen-hydrogen mixtures. A meter on the top panel of the instru- ent indicates the percentage concentration of hydrogen in the sample under st. The equipment incorporates a self-contained power supply which is con- olled by a rheostat on the top panel.

ELATIONSHIP TO OTHER EQUIPMENT:

LECTROMECHANICAL DESCRIPTION:

ircuit Information: The instrument contains a balanced electrical circuit with a heated catalytic filament. Six standard flashlight dry cells supply the current for this circuit. An aspirator bulb and connecting tube draw samples of the

(Continued)

	AIR FORCE	NAVY	ARMY
YPE CLASS.			
TOCK NOS.			
ROCUREM'T INFO.:			
ROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
.L.L.N.:		FUNCTIONAL CLASS. NO.: 17	
- Electronics Test Equipment -			MSA 3

EXPLOSIMETER
MODEL 3
(Mine Safety Appliances Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

atmosphere to be tested through a filter chamber and into a combustion chamber. As the combustibles in the sample are burned on the filament, the temperature of the filament is raised; thus the resistance of the filament is increased in proportion to the concentration of combustibles. The increase in resistance of this component of the balanced circuit results in an unbalance which causes a deflection of the meter pointer on the scale.

Power Supply: 6 dry cells connected in parallel.

Meter Calibration: 0 to 100%, red portion from 60% of scale indicates that gas concentrations have reached explosive levels.

MANUFACTURERS' OR CONTRACTORS' DATA:

Mine Safety Appliances Company, Pittsburgh, Pennsylvania.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

BuOrd Assembly Dwg 388670-8. Supplementary Instructions of the Explosimeter Models 3 and 4 furnished by the contractor.

SHIPPING DATA:

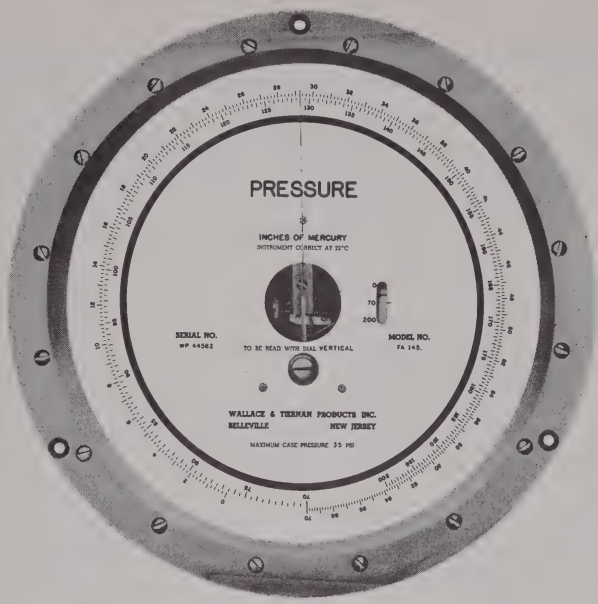
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weigh Packe (Lbs.)
			H	W	D	
	Explosimeter, Mine Safety Appliances 3					

EXPLOSIMETER
MODEL 3
(Mine Safety Appliances Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Explosimeter MSA 3	metal		5	4-1/4	3	
1	Explosimeter Line			36 long			
1	Explosimeter Cap			1-3/8			
1	Spare Detector Filament Unit						

PRECISION DIAL MANOMETER
MODEL FA-145501
(Wallace and Tiernan, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose unit used to calibrate pressure indicating instruments such as those associated with wind tunnels and power plant test stands, and as a receiver for force-balance apparatus used to measure torque, thrust or liquid level. Test results are indicated directly in inches of mercury.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The manometer consists basically of a pressure-sensitive element constructed of beryllium-copper. During measurement, motion is transferred to a pointer shaft. The indicator movement uses flexure pivots and transfers the slightest motion. A reference pressure is maintained between the exterior case of the pressure-sensitive element and the interior case enclosing the element, thereby permitting measurements of absolute pressure.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.L.N.:		FUNCTIONAL CLASS. NO.: 17	

PRECISION DIAL MANOMETER
MODEL FA-145501
(Wallace and Tiernan, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)

The dial provides a scale length of 45 inches and the indicating pointer is capable of rotating two revolutions. A revolution counter provides a means of indicating the proper scale to be read. A pressure limiting valve is provided as a safety feature. Excess pressure of more than 20 percent of the calibrated range bypasses the pressure-sensitive capsule.

Power Supply: None.
Range: 0 to 120 inches of water in two ranges.
Sensitivity: 1.0 part in 10,000 of full scale.
Accuracy: 1.0 part in 1000 of full scale.
Zero Suppression: Up to 25% of maximum range.
Hysteresis: 1.0 part in 1000 of pressure range to 250 inches of mercury; 1.0 part in 500 of pressure range above 250 inches of mercury.
Temperature Effect: 0.375% of indicated reading per 10°C change.
Maximum Case Pressure: 35 pounds per square inch.

MANUFACTURERS' OR CONTRACTORS' DATA:

Wallace and Tiernan, Incorporated, 25 Main Street, Belleville 9, New Jersey; Approximate Cost per Unit, $275.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

SHIPPING DATA:

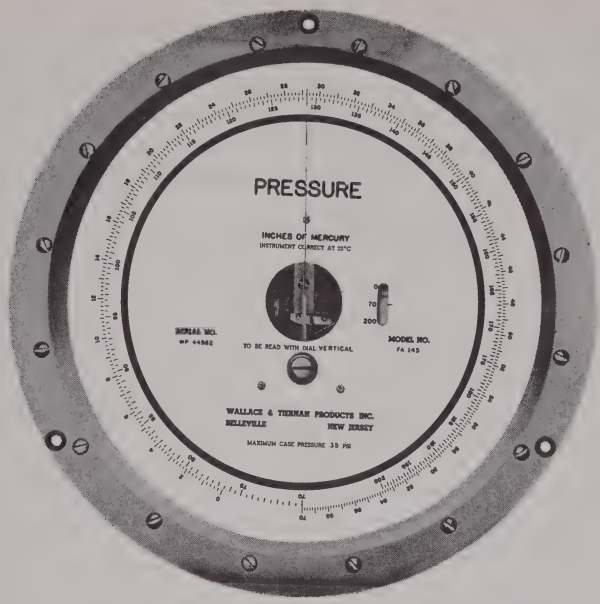
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Precision Dial Manometer Wallace and Tiernan FA-145501					20

PRECISION DIAL MANOMETER
MODEL FA-145501
(Wallace and Tiernan, Incorporated)

QUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Precision Dial Manometer Wallace and Tiernan FA-145501	metal			10-11/16 dia.	4-11/16	8

PRECISION DIAL MANOMETER
MODEL FA-145511
(Wallace and Tiernan, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose unit used to calibrate pressure indicating instruments such as those associated with wind tunnels and power plant test stands, and as a receiver for force-balance apparatus used to measure torque, thrust or liquid level. Test results are indicated directly in inches of mercury.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The manometer consists basically of a pressure-sensitive element constructed of beryllium-copper. During measurement, motion is transferred to a pointer shaft. The indicator movement uses flexure pivots and transfers the slightest motion. A reference pressure is maintained between the exterior case of the pressure-sensitive element and the interior case enclosing the element, thereby permitting measurements of absolute

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.L.N.:		FUNCTIONAL CLASS. NO.: 17	

PRECISION DIAL MANOMETER
MODEL FA-145511
(Wallace and Tiernan, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)

pressure. The dial provides a scale length of 45 inches and the indicating pointer is capable of rotating two revolutions. A revolution counter provides a means of indicating the proper scale to be read. A pressure limiting valve is provided as a safety feature. Excess pressure of more than 20 percent of the calibrated range bypasses the pressure-sensitive capsule.

Power Supply: None.
Range: 0 to 120 inches of mercury in two ranges.
Sensitivity: 1.0 part in 10,000 of full scale.
Accuracy: 1.0 part in 1000 of full scale.
Zero Suppression: Up to 25% of maximum range.
Hysteresis: 1.0 part in 1000 of pressure range to 250 inches of mercury; 1.0 part in 500 of pressure range above 250 inches of mercury.
Temperature Effect: 0.375% of indicated reading per 10°C change.
Maximum Case Pressure: 35 pounds per square inch.

MANUFACTURERS' OR CONTRACTORS' DATA:

Wallace and Tiernan, Incorporated, 25 Main Street, Belleville 9, New Jersey; Approximate Cost per Unit, $275.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

SHIPPING DATA:

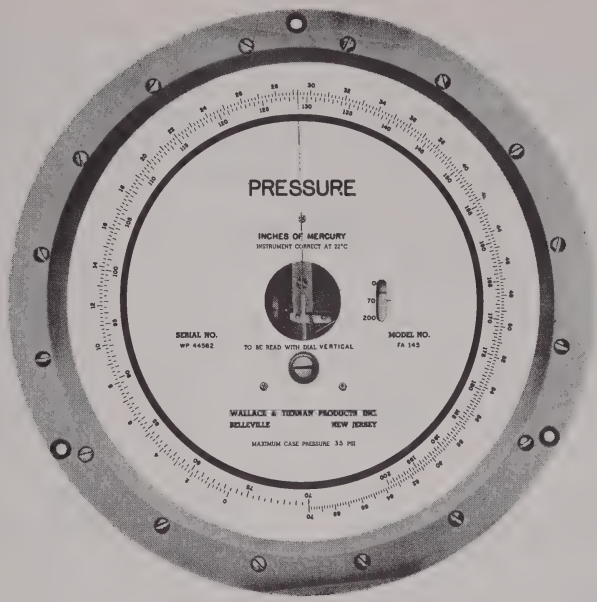
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Precision Dial Manometer, Wallace and Tiernan FA-145511					20

PRECISION DIAL MANOMETER
MODEL FA-145511
(Wallace and Tiernan, Incorporated)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Precision Dial Manometer Wallace and Tiernan FA-145511	metal			10-11/16 dia.	4-11/16	8

PRECISION DIAL MANOMETER
MODEL FA-145541
(Wallace and Tiernan, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose unit used to calibrate pressure indicating instruments such as those associated with wind tunnels and power plant test stands, and as a receiver for force-balance apparatus used to measure torque, thrust or liquid level. Test results are indicated directly in inches of mercury.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The manometer consists basically of a pressure-sensitive element constructed of beryllium-copper. During measurements motion is transferred to a pointer shaft. The indicator movement uses flexure pivots and transfers the slightest motion. A reference pressure is maintained between the exterior case of the pressure sensitive element and the interior case enclosing the element thereby permitting measurements of absolute pressure.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.L.N.:		FUNCTIONAL CLASS. NO.: 17	

PRECISION DIAL MANOMETER
MODEL FA-145541
(Wallace and Tiernan, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)

The dial provides a scale length of 45 inches and the indicating pointer is capable of rotating two revolutions. A revolution counter provides a means of indicating the proper scale to be read. A pressure limiting valve is provided as a safety feature. Excess pressure of more than 20 percent of the calibrated range bypasses the pressure sensitive capsule.

Power Supply: None.
Range: 0 to 300 inches of mercury in two ranges.
Sensitivity: 1.0 part in 10,000 of full scale.
Accuracy: 1.0 part in 1000 of full scale.
Zero Suppression: Up to 25% of maximum range.
Hysteresis: 1.0 part in 1000 of pressure range to 250 inches of mercury; 1.0 part in 500 of pressure range above 250 inches of mercury.
Temperature Effect: 0.375% of indicated reading per 10°C change.
Maximum Case Pressure: 35 pounds per square inch.

MANUFACTURERS' OR CONTRACTORS' DATA:

Wallace and Tiernan, Incorporated, 25 Main Street, Belleville 9, New Jersey
Approximate Cost per Unit, $275.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Precision Dial Manometer Wallace and Tiernan FA-145541					20

PRECISION DIAL MANOMETER
MODEL FA-145541
(Wallace and Tiernan, Incorporated)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Precision Dial Manometer Wallace and Tiernan FA-145541	metal			10-11/16 dia.	4-11/16	8

17.1 SPECIFIC GRAVITY MEASURING DEVICES

HYDROMETER HY-2

FUNCTIONAL DESCRIPTION:

A general purpose, syringe-type hydrometer used for testing the specific gravity of storage battery electrolytes. It consists of a glass syringe with a soft rubber bulb, an inlet tube, and a glass hydrometer float. The float is marked with a specific gravity scale.

RELATIONSHIP TO OTHER EQUIPMENT:

Similar to Edelman #30 Hydrometer.

ELECTROMECHANICAL DESCRIPTION:

Specific Gravity Range: 1.100 to 1.300.
Temperature Range: -60° F. to +160° F.

MANUFACTURERS' OR CONTRACTORS' DATA:

E. Edelman and Company, Chicago, Illinois; Army Order No. 130-P-45; Approximate Cost per Unit, $0.36, May 1953.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-422556		3B2202
PROCUREM'T INFO.:	Fed. Spec. GG-H-941		
PROCUREM'T COG.:	Army	DESIGN COG.:	Army, SSL
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	17.1.1

is project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

HYDROMETER HY-2

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Hydrometer HY-2 (Export Packed)	0.03	14-3/4	1-7/8	1-7/8	0.7

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Hydrometer HY-2	Glass	7CAD-422556 3B2202	14-1/2	1-5/8	1-5/8	0.25

HYDROMETER TS-469/U

FUNCTIONAL DESCRIPTION:

A portable general purpose syringe gravity float type hydrometer used for measuring specific gravity of liquids within its range. It is particularly useful in checking the condition of storage batteries, and is used for this purpose each time the battery is used. Otherwise, operation of prime equipment might be impaired.

RELATIONSHIP TO OTHER EQUIPMENT:

It is similar to Exide type AS-2 Hydrometer Syringe.

MECHANICAL DESCRIPTION:

Physical Characteristics: The hydrometer syringe consists of a hard rubber overflow tube and a glass barrel, inside which is a calibrated hydrometer float. By means of a soft rubber bulb the liquid to be tested is drawn into the glass barrel through a hard rubber tube. The hydrometer float displaces its weight of liquid and the specific gravity of the liquid is read directly on the calibrated scale.

Power Supply: None.

Specific Gravity Indicating Range: 1.100 to 1.300.

Specific Gravity of Storage Battery Fluid, when in Operating Condition: 1.225 to 1.250, or higher.

Maximum Error: $\pm 0.005^{\circ}$ specific gravity ($60^{\circ}F/15\text{-}5/9^{\circ}C$).

MANUFACTURERS' OR CONTRACTORS' DATA:

The Electric Storage Battery Company, Exide Industrial Division, 42 South 15th Street, at Chestnut, Philadelphia 2, Pennsylvania.

REFERENCE DATA AND LITERATURE:

TM 11-375B (TO 16-40RC120-5) (Operating and Maintenance Instructions for RC-120).

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			3B2227
PROCUREM'T INFO.:			
PROCUREM'T COG.: USA		DESIGN COG.: USA, SigC, SSL	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 17.1.1	
- Electronics Test Equipment -			TS-469/U

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Hydrometer TS-469/U (In mailing tube)					0.65

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Hydrometer TS-469/U		3B2227	14-1/4	1-11/16 dia.		0.25

17.3 MANOMETERS

MERCURY "30" MANOMETER
Model A-203
(Meriam Instrument Company)

FUNCTIONAL DESCRIPTION:

A portable general purpose direct reading basic standard of pressure measurement designed for a line operating pressure of 250 pounds per square inch. This instrument can be used for indicating flow meter applications and to measure pressure fall or distribution across operating equipment when the line pressure does not exceed the designed maximum.

RELATIONSHIP TO OTHER EQUIPMENT:

MECHANICAL DESCRIPTION:

The manometer well is of large circular cross section and connects directly to the indicating column at the lower end block. Two 1/4-inch female pipe connections are provided on the top side of the well; one outlet is normally used for the high pressure manometer connection while the other, provided with a plug, is used as the well fill connection. The unit scale located directly behind the glass indicating tube, extends the full width of the instrument body and is graduated in each side of the indicating column. Scale furnished is a white, non-glare,

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 17.3	
- Electronics Test Equipment -			Meriam Model A-203

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

MERCURY "30" MANOMETER
Model A-203
(Meriam Instrument Company)

MECHANICAL DESCRIPTION: (Continued)

satin background with black graduations and figures, and is compensated for liquid level change within the manometer well. The scale is adjustable for zero indicating fluid level by means of a non-slip, flexible shaft adjustment operated from the front of the instrument.

Scale: Graduated in inches and tenths.

Indicating Fluid: Mercury.

MANUFACTURERS' OR CONTRACTORS' DATA:

The Meriam Instrument Company, 10920 Madison Avenue, Cleveland 2, Ohio; Approximate Cost per Unit, $60.00.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog Sheet A-203.

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Mercury "30" Manometer Meriam Model A-203			39-1/8	6	8-5/8	25

MANOMETER
MODEL 30PA10
(Meriam Instrument Company)

FUNCTIONAL DESCRIPTION:

A portable, general purpose well type manometer having a flexible scale arrangement whereby one unit may be used to test and maintain accurate calibration of all aircraft pressure measuring or sensing instruments. The instrument provides a direct reading when measuring a given pressure, vacuum or differential. This manometer is generally considered and accepted as a primary standard.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

The instrument has a 61 inch indicating range and consists of a scale selector unit, indicating tube, manometer well, scale elevating mechanism, protective case with plate glass cover, return well and mounting stand. The manometer case is of heavy gauge steel enclosing the scale drum and glass tube. The indicating tube is of Pyrex glass using either water or mercury as the indicating liquid. The scale mechanism consists of a drum having a cross section of an

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.	Standard	Standard	
STOCK NOS.		(ASO)R88TO835-060-000	
PROCUREM'T INFO.:			
PROCUREM'T COG.: USAF		DESIGN COG.: Commercial	
F.I.I.N.: 6685-526-5325		FUNCTIONAL CLASS. NO.: 17.3	
- Electronics Test Equipment - Meriam 30PA10			

MANOMETER
MODEL 30PA10
(Meriam Instrument Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

eight-sided polygon. Selection of the proper scale is accomplished by turning a knurled knob which mechanically pivots the scale drum. Scales can be added or changed and special scales may be ordered.

Power Supply: None.

Standard Scales Using Mercury:

Pounds and Tenths Range: 0 to 30 pounds.
Inches and Tenths Range: 0 to 61 inches.
Inches and Tenths Absolute Pressure below Barometer Range: 31 to 0 inches
Inches and Tenths Absolute Pressure above Barometer Range: 28 to 89 inches
Centimeters and Millimeters Range:
80 to 0 centimeters.
0 to 156 centimeters.
Miles per Hour Airspeed Range: 250 to 750 miles per hour.
Knots Airspeed Range: 200 to 600 knots.
Altitude in Thousands of Feet Range:
-1000 to +80,000 feet; adjustable barometric range 787 to 735 millimeters.
1000 to 80,000 feet; adjustable barometric range 734 to 683 millimeters
3000 to 8000 feet; adjustable barometric range 682 to 634 millimeters.
Accuracy: Corrected to 0°C for observed temperature of 22°C.

Standard Scales Using Water:

Inches and Tenths Range: 0 to 61 inches.
Miles per Hour Airspeed Range: 0 to 344 miles per hour.
Knots Airspeed Range: 0 to 295 knots.
Accuracy: Corrected to 4°C for observed temperature of 22°C.

MANUFACTURERS' OR CONTRACTORS' DATA:

Meriam Instrument Company, 10920 Madison Avenue, Cleveland 2, Ohio; Contract No. AF 33(604)15090 and AF 33(604)9467; Approximate Cost per Unit, (without scales) $297.75.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33A7-4-3-11 (Operation and Service Instructions). Manufacturer's Bulletin 2

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Manometer, Meriam 30PA10					

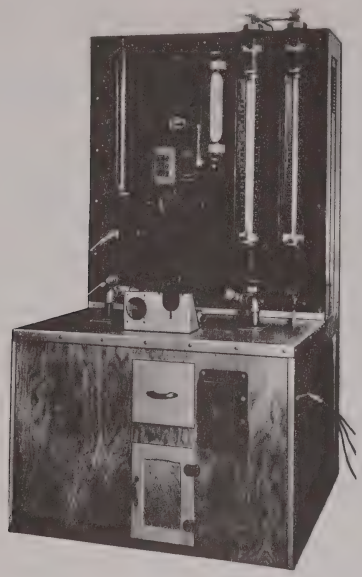
MANOMETER
MODEL 30PA10
(Meriam Instrument Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Manometer Meriam 30PA10	metal		77-1/2	12	13-1/4	60

17.4 FLOW CALIBRATORS AND INDICATORS

TESTER, FUEL FLOWMETER
MODEL 122
(Liberty Motors and Engineering Co.)



FUNCTIONAL DESCRIPTION:

A general purpose test stand especially designed and constructed to facilitate testing of all types of fuel flowmeters. The main types concerned are Fischer and Porter direct reading and Eclipse-Pioneer remote-indicating autosyn type fuel flowmeters. Rate of flow of the gasoline through the flowmeter under test is indicated by two rotameters calibrated in terms of pounds of pressure and gallons per hour. Hydrometer readings are applied to a correction curve for specific gravity corrections.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Power Supply: 220 volts, AC, 60 cycles per second, 3-phase; 440 volts, AC, 60 cycles per second, 2-phase.

Dial Thermometer: -10°C to +40°C.

Rotameter(1): 20 gallons per hour and 100 pounds per hour to 100 gallons per

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.		(ASO) R88-T-830	
PROCUREM'T INFO.: Spec SQ147			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.L.I.N.: 6625-390-6000		FUNCTIONAL CLASS. NO.: 17.4	

TESTER, FUEL FLOWMETER
MODEL 122
(Liberty Motors and Engineering Co.)

ELECTROMECHANICAL DESCRIPTION: (Continued)

hour and 600 pounds per hour.

Rotameter(2): 100 gallons per hour and 500 pounds per hour to 500 gallons per hour and 3000 pounds per hour.

Clock: 24 hour.

Gage Thermometer: 0°C to 100°C.

Fuel Pressure Range: 0 to 25 pounds per square inch.

Rotary Pump: 3/4 horse power, 1725 revolutions per minute.

MANUFACTURERS' OR CONTRACTORS' DATA:

Liberty Motors and Engineering Company, Baltimore, Maryland.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

AN 05-95-38 Handbook of Operation and Service Instruction.

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Tester, Fuel Flowmeter Liberty 122					

TESTER, FUEL FLOWMETER
MODEL 122
(Liberty Motors and Engineering Co.)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Tester, Fuel Flowmeter Liberty 122		R88-T-830(Navy)				
1	Y-Cable						
1	Cable						
1	Nipple, Brass			3-1/2 long	1 dia.		
1	Nipple, Brass			3 long	1 dia.		
3	Elbow, Street 90°				1 dia.		
1	Elbow, Street 45°				1 dia.		
2	Fitting, Swivel Hose				1 dia.		
1	Nipple, Brass			2 long	1 dia.		
1	Nipple, Close				1 dia.		

ELECTRONIC FLOWMETER TACHOMETER
MODEL 6A
(Potter Aeronautical Company)

FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to indicate the flow rate of liquids. The instrument can also be used with associated test equipment, as a frequency meter, or as a tachometer. Volumetric flow in terms of pounds or gallons is obtained by multiplying the number indicated on the 6-digit counter by a conversion factor which is constant for the sensing element used. When the instrument is used as a frequency meter or tachometer, test results are obtained by using an external recorder in conjunction with a chart.

RELATIONSHIP TO OTHER EQUIPMENT:

A sensing element is required to complete the electronic flowmeter system.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument consists essentially of an electronic converter which produces a DC signal directly proporational to the frequency of the input signal, and a recorder which indicates the output of the electronic converter.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 17.4	
- Electronics Test Equipment -			Potter 6A

ELECTRONIC FLOWMETER TACHOMETER
MODEL 6A
(Potter Aeronautical Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

An oscillator, which is controlled by an electronically operated turning fork, is employed as a frequency standard for calibration purposes. A blower is incorporated to minimize thermal drift.

Power Supply: 115 volts, AC, 60 cycles per second.

Input Signal Range: 5 to 3200 cycles per second.

Input Sensitivity: 0.005 to 5 volts rms.

Linearity: Within 0.1% over operating range; less than 0.25% drift for 5-volt power change.

Oscillator Frequency: 100 ±0.15 cycles per second over a temperature range of -20°C to +80°C.

Counter Accuracy: ±31 cycles per second of total count.

MANUFACTURERS' OR CONTRACTORS' DATA:

Potter Aeronautical Company, 85-87 Academy Street, Newark 2, New Jersey.

TUBE COMPLEMENT:

3 12AX7, 1 6J6, 5 5693, 1 12AU7, 1 6AQ6, 2 6AU6, 1 OA2, 1 2D21, 1 5W4, 2 1N34A.

REFERENCE DATA AND LITERATURE:

Manufacturer's Instruction Book.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Electronic Flowmeter Tachometer Potter 6A			14	9	9	30

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Electronic Flowmeter Tachometer, Potter 6A					

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 18

KINEMATIC TEST AND MEASURING EQUIPMENT

18

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 18

KINEMATIC TEST AND MEASURING EQUIPMENT

18

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

18. KINEMATIC TEST AND MEASURING EQUIPMENT

- 18.1 Vibration Test Equipment
  - 18.1.1 Vibration Meter
  - 18.1.2 Vibration Test Stand
- 18.2 Displacement, Velocity, and Acceleration Measuring Equipment
  - 18.2.1 Accelerometer
  - 18.2.2 WOW Meter

18. KINEMATIC TEST AND MEASURING EQUIPMENT
An equipment designed to measure the magnitude and characteristics of the mechanical motions and their rates for equipment under test.

18.1 VIBRATION TEST EQUIPMENT
An equipment designed to measure the degree of vibration or the effects of vibration on an equipment under test.

18.1.1 VIBRATION METER
A device specifically designed to measure the amplitude of vibration of an equipment under test.

18.1.2 VIBRATION TEST STAND
A device specifically designed for measuring the effects of vibration on instruments.

18.2 DISPLACEMENT, VELOCITY, AND ACCELERATION MEASURING EQUIPMENT
An equipment designed to measure the change in position of an object, the rate of change of position, and/or the variation in the rate of change of position.

18.2.1 ACCELEROMETER
An equipment designed to measure the time rate of change in velocity of a moving object.

18.2.2 WOW METER
An instrument designed to indicate the instantaneous speed variation of a turntable or similar equipment.

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Functional Classification	Designation	Name	
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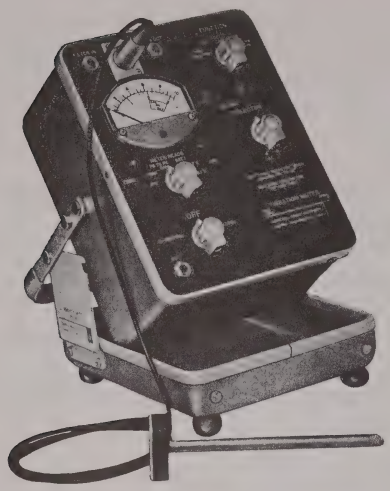
18.2	Sperry T-101098	Fixture, Test Integrator, Variable Speed Drive	327
18.2	Sperry T-101235	Fixture, Variable Speed Drive Navigation Unit	329

Designation	Name	Functional Classification
General Radio 1553-A	Vibration Meter	18. 1. 1
M. B. Manufacturing M3	Vibration Meter	18. 1. 1
Sperry T-101098	Fixture, Test Integrator, Variable Speed Drive	18. 2
Sperry T-101235	Fixture, Variable Speed Drive Navigation Unit	18. 2

18. KINEMATIC TEST AND MEASURING EQUIPMENT

18.1 VIBRATION TEST EQUIPMENT

VIBRATION METER
Type 1553-A
(General Radio Company)



FUNCTIONAL DESCRIPTION:

A portable, general purpose instrument used to measure acceleration, velocity, displacement and jerk in machines and structures. This equipment is useful for checking the operating condition of bearings, gear trains and other mechanisms. The meter indicates vibration data directly in peak-to-peak, peak, or average inches; inches per second; inches per second squared; or inches per second cubed.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The vibration meter consists of an inertia-operated, barium-titanate ceramic pickup, which delivers a voltage proportional to the acceleration of the vibratory motion, an adjustable attenuator, an amplifier and an indicating meter. Integrating networks can be switched to convert the output of the vibration pickup to a voltage proportional to either displacement or velocity. A differentiating network can be switched in to convert the output of the vibration pickup to a voltage proportional to time rate of change of acceleration or

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 18.1.1	
- Electronics Test Equipment - General Radio 1553-A			

VIBRATION METER
Type 1553-A
(General Radio Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

jerk. Filter jacks on the front panel allow the use of external high-pass filters when it is desired to eliminate the frequency components below 30 or 70 cycles per second.

Power Supply: 3 size D batteries; 1 67-1/2-volt battery (Burgess Type XX45 or equivalent).

Meter Ranges:

Acceleration: 0.3 to 300,000 inches per second squared, peak-to-peak. 0.1 to 100,000 inches per second squared, average.

Velocity: 0.03 to 30,000 inches per second, peak-to-peak. 0.1 to 10,000 inches per second, average.

Displacement: 0.003 to 300 inches, peak-to-peak; 0.001 to 300 inches, average, from 2 to 1200 cycles per second; 0.00003 to 30 inches, peak-to-peak; 0.00001 to 10 inches, average, from 20 to 1200 cycles per second.

Jerk: 30 to 300,000 inches per second cubed, peak-to-peak; 10 to 300,000 inches per second cubed, average.

Frequency Range:

Acceleration: 2 to 1200 cycles per second.

Velocity: 2 to 20 cycles per second.

Displacement: 2 to 20 cycles per second.

Accuracy: ±10% full scale.

Input Impedance: 25 megohms.

Voltage Output: 5 volts rms across 75,000 ohms for full scale meter deflection.

Attenuator Range: 100,000 to 1, in 10 steps.

MANUFACTURERS' OR CONTRACTORS' DATA:

General Radio Company, Baker Avenue, West Concord, Massachusetts; Approximate Cost per Unit, $675.00.

TUBE COMPLEMENT:

2 CK512AX, 5 CK6418, 2 2N520A, 1 2N527, 1 2N377A.

REFERENCE DATA AND LITERATURE:

Manufacturer's Catalog.

SHIPPING DATA:

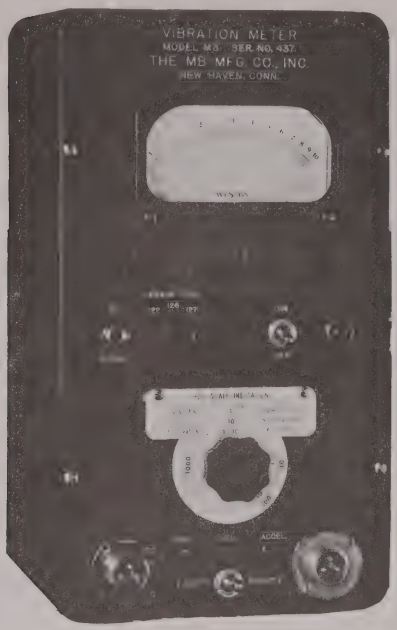
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Vibration Meter General Radio 1553-A					

VIBRATION METER
Type 1553-A
(General Radio Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Vibration Meter General Radio 1553-A	alum-inum		9-1/4	8	7-1/2	10-1/2
1	Vibration Pickup General Radio 1560-P51						

VIBRATION METER
MODEL M3
(M.B. Manufacturing Company, Incorporated)



FUNCTIONAL DESCRIPTION:

A portable, general purpose equipment used to measure steady state acceleration, velocity and displacement of a body. When used with associated vibration pickups, the equipment provides a meter reading proportional to the velocity of vibratory motion. Means are also provided which convert this output to direct meter readings of displacement and acceleration. The response of the equipment is selected by a three-position switch which permits independent readings of acceleration, velocity and displacement of a body.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The equipment consists essentially of an adjustable attenuator, an integrating network, a differentiating network, an amplifier and a direct reading meter.

Power Supply: 110 volts, AC, 60 cycles per second.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 18.1.1	
- Electronics Test Equipment -			M.B. M3

VIBRATION METER
MODEL M3
(M.B. Manufacturing Company, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)
Acceleration Measurement Range: 0.1 to 1000 "g" ±2%.
Velocity Measurement Range: 0.001 to 1000 inches per second ±2%.
Displacement: 0.0001 to 1 inch ±2%.
Frequency Response: 10 to 1000 cycles per second.

MANUFACTURERS' OR CONTRACTORS; DATA:
M.B. Manufacturing Company, Incorporated, 1060 State Street, New Haven, Connecticut; Approximate Cost per Unit, $1,100.00.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:
Manufacturer's Catalog.

EQUIPMENT SUPPLIED:

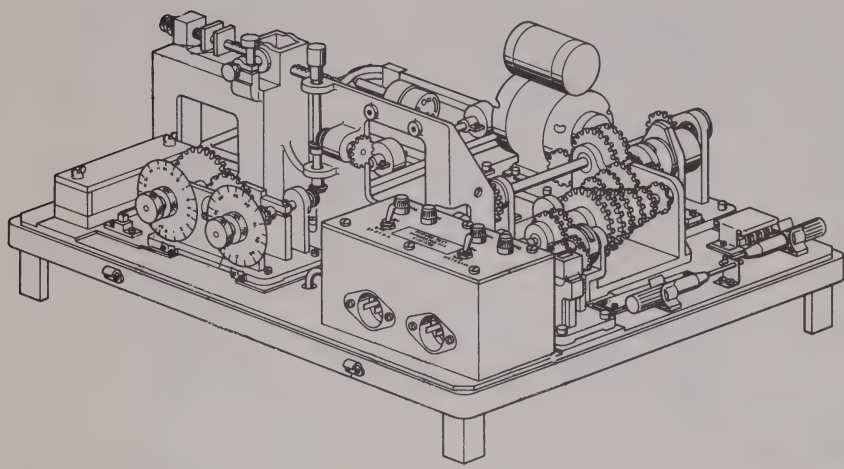
Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Vibration Meter M.B. Manufacturing M3	metal		13-1/2	7	9	12

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Vibration Meter M.B. Manufacturing M3					

18.2 DISPLACEMENT, VELOCITY, AND ACCELERATION MEASURING EQUIPMENT

FIXTURE, TEST INTEGRATOR, VARIABLE SPEED DRIVE
Part No. T-101098
(Sperry Gyroscope Company)



FUNCTIONAL DESCRIPTION:

This is a portable, depot level test device designed to check the accuracy of the range variable speed drive assemblies in the N-S and E-W rate units of Tracking Computer type B-2A. The computer is a component of the Bombing Navigational Systems types K-1A, K-2A, K-3A, and K-4A.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The fixture provides a means of comparing the output from the range variable speed drive assembly under test against a reference output supplied by the fixture. The circuit contains three gear trains. One gear train is used to displace the adjustable ball carriage of the range V.S.D. assembly under test. A second gear train provides an adjustable speed, reference velocity which is fed into a differential mechanism. A third gear train drives the range V.S.D. assembly. The outputs from the drum of the variable speed drive assembly and the adjustable gear drive assembly are fed into the differential. The difference

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-294519		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 18.2	
	- Electronics Test Equipment -		Sperry T-101098

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U.S.A.

FIXTURE, TEST INTEGRATOR, VARIABLE SPEED DRIVE
Part No. T-101098
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

in their number of revolutions over a given period of time is recorded on a counter and indicates the error in the range variable speed drive assembly. Two dials on the front of the test fixture permit the introducing of fine and coarse wind rate values into the variable speed drive assembly. The torque power which provides the reference velocity and drives the assembly under test is furnished by a synchronous type motor. A magnetic clutch is used to control the reference velocity gear train.

Power Supply: 115 volts, AC, 60 cycles per second, single-phase; 27.5 volts, DC.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sperry Gyroscope Company, Division of the Sperry-Rand Corporation, Great Neck, Long Island, New York.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-5-71-1 (Operation and Service Instructions).

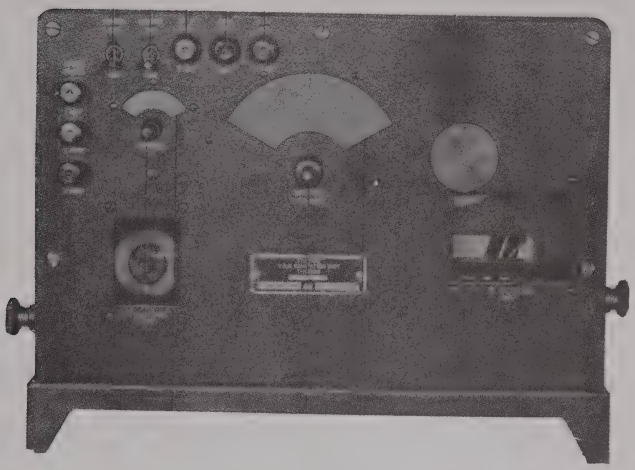
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Test Integrator, Variable Speed Drive (Sperry T-101098)		7CAC-294519	12	25-3/16	20-13/16	30

FIXTURE, VARIABLE SPEED DRIVE NAVIGATION UNIT
Part No. T-101235
(Sperry Gyrsocope Company)



FUNCTIONAL DESCRIPTION:

This fixture is a depot level test device designed to test the variable speed drive bracket assembly in the navigation control. The navigation control is a component of the Bombing Navigational Computer type A-1A, which is part of the Bombing Navigational Systems Type K-1A, K-2A, K-3A, or K-4A.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The fixture contains three gear trains. One gear train is used to introduce latitude values into the assembly under test. The second gear train is used to introduce degrees of longitude values in terms of input revolutions into the assembly under test. The third gear train is used to record the output revolutions of the assembly under test. The input revolutions are supplied by means of a split phase, synchronous motor and controlled by means of a magnetic clutch. The fixture panel contains a minutes latitude dial and a degrees latitude dial. An output counter and an input counter provide comparative readings of revolutions. The input is automatically stopped at a predetermined number of revolutions by a switch which disengages the magnetic clutch. The output counter should then

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAC-801315-67		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 18.2	
	- Electronics Test Equipment -		Sperry T-101235

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

FIXTURE, VARIABLE SPEED DRIVE NAVIGATION UNIT
Part No. T-101235
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

indicate a specified value for the particular setting of the latitude dial.

Power Supply: 115 volts, AC, 60 cycles per second, single-phase; 27 volts, DC.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sperry Gyroscope Company, Division of the Sperry-Rand Corporation, Great Neck, Long Island, New York.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-5-78-1 (Operation and Service Instructions).
TO 33D5-5-78-4 (Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Variable Speed Drive Navigation Unit (Sperry T-101235)		7CAC-801315-67	11	16	12-1/2	

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 19

OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

19

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

ELECTRICAL & ELECTRONIC

TEST EQUIPMENT DATA HANDBOOK

VOLUME 19

OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

19

FREDERICK RESEARCH CORPORATION
2601 UNIVERSITY BOULEVARD, WEST
WHEATON, MARYLAND

19. OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

19.1 Collimation Equipment

19.2 Photographic Test Equipment

19. OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

An equipment designed to test, measure, and/or align optical systems.

19.1 COLLIMATION EQUIPMENT

An equipment specifically designed to align optical equipment.

19.2 PHOTOGRAPHIC TEST EQUIPMENT

Equipment designed to test cameras and other photographic equipment.

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Functional Classification	Designation	Name	
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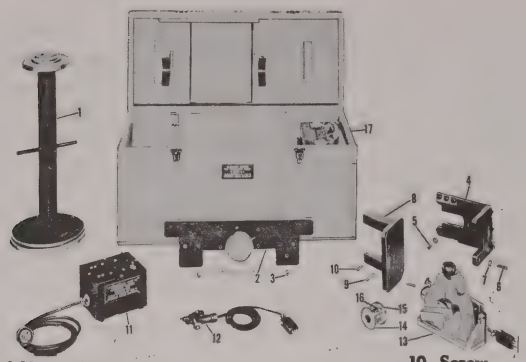
ALPHA-NUMERICAL INDEX

Designation	Name	Functional Classification
Eastman E 33501	Fixture, Collimator Assembly	19.1
Eastman E 33502	Fixture, Drive Unit	19.1
Eastman E 33504	Fixture, Alignment	19
Eclipse-Pioneer 13021-1-B	Driftmeter Collimator	19.1
General Mills TSY-7001	Head End Focal Length Scope	19
General Mills TSY-7018	Optical Bench	19
General Mills TSY-7060	Fixture, Light Transmission Check	19
Heiland ST-2	Synchrotester	19.2
Sperry T-101000	Collimator	19.1
Sperry 1,000,013	Optical Target Tester	19.1

19. OPTICAL TESTING, MEASURING, AND ALIGNING EQUIPMENT

FIXTURE, ALIGNMENT
Part No. E 33504
(Eastman Kodak Company)



1—Alignment Gage*
2—Alignment Bar and Mirror Assembly
3—Screw
4—Mounting Bracket*
5—Screw
6—Screw
7—Washer
8—Bracket
9—Screw
10—Screw
11—Power Supply Box
12—Illuminated Eyepiece
13—Clinometer and Mirror Assembly
14—Mirror Adapter*
15—Stop Screw
16—Mirror Bracket Screw
17—Storage Box

FUNCTIONAL DESCRIPTION:

The alignment fixture is a special depot maintenance tool designed for use in the optical alignment of the prism head test fixture for the Y-3 Vertical Periscopic Bombsight. The unit has the necessary components for calibrating collimators, optically aligning collimator reticles, setting the zero collimator reticle, and supplying low voltage power for the aligning components.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Description: A clinometer and mirror assembly is used for optically measuring angles. A backlighted internal glass dial permits angle readings to the nearest 10 seconds. A separate illuminated beam splitter eyepiece with a low wattage light source is used to align reticles by auto-collimating off clinometer mirror.

An alignment bar and mirror assembly is used to set up the reticle of the zero collimator prior to the alignment of the other collimators. The alignment bar supports the clinometer during aligning operations.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-294524		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19	
	- Electronics Test Equipment -		Eastman E 33504

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

FIXTURE, ALIGNMENT
Part No. E 33504
(Eastman Kodak Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

A power supply box provides a fused low-voltage supply for the clinometer lamps and the illuminated eyepiece. This box contains a stepdown transformer and two electrical receptacles.

Power Supply: 115 volts, AC, 60 cycles per second, single phase.
Dial Calibrations: 0 to 360 degrees, 10-minute divisions.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eastman Kodak Company, 343 State Street, Rochester, New York; Contract No. AF 33(038)14792.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-9-34-3 (Operation and Service Instructions).
TO 33D5-9-34-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Fixture, Alignment (Eastman Kodak E33504)	14	24	42	22	182

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Alignment (Eastman E33504)	Wood	7CAD-294524	15	32	14	130
	Including:						
1	Clinometer and Mirror Assembly E 33617-2	Wood					
1	Bracket E 33617-13	Wood					

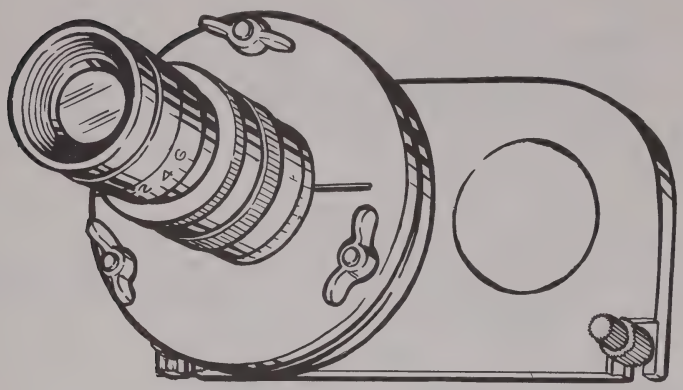
(Continued)

FIXTURE, ALIGNMENT
Part No. E 33504
(Eastman Kodak Company)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Illuminated eyepiece E 33504-16	Wood					
1	Alignment Bar & Mirror Assembly E 33504-6	Wood					
1	Power Supply Box E 33504-12	Wood					

HEAD END FOCAL LENGTH SCOPE
Part No. TSY-7001
(General Mills, Incorporated)



FUNCTIONAL DESCRIPTION:

A general purpose, portable test device designed for checking the accommodation, resolution, astigmatism, and curvature of field of the optical systems of the horizontal periscopic bombsights. The accommodation and infinity settings of other telescopes may also be checked with this equipment. The head end focal length scope consists of an auxiliary diopter telescope with an adjusting device and various adapters for use when checking the different bombsight optical systems.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Description: The diopter telescope is a double lens cell optical system consisting of an eyepiece, adjustable for accommodating the diopter telescope to the user's eye, a cross hair type reticle for proper accommodation adjustment, and an objective. The eyepiece and reticle in a draw tube are actuated through a graduated ring for focusing on the object. The eyepiece may be focused from plus 4 to minus 5 diopters, with the actuating ring graduated in 1/4 diopter graduations through this range. The telescope adjusting device consists of a spring loaded clamping plate to facilitate collimating the optical axis of the telescope and the equipment being tested.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	9CGZ-TSY-7001		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19	
- Electronics Test Equipment -General Mills TSY-7001			

his project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

HEAD END FOCAL LENGTH SCOPE
Part No. TSY-7001
(General Mills, Incorporated)

ELECTROMECHANICAL DESCRIPTION: (Continued)

The telescope is normally focused upon the image that is formed by the opti cal system being tested. The light from this image, passing through the diopte telescope, is magnified approximately two diameters for clarification and th image appears at the scope eyepiece. The reticle cross hairs are aligned wit some reference point of the image, usually the reticle of the bombsight, and thi alignment is then used for the collimation of the equipment being tested.

Power Supply: None.

MANUFACTURERS' OR CONTRACTORS' DATA:

General Mills, Incorporated, Mechanical Division, Minneapolis, Minnesota; Con tract No. AF 33(038)-14786, dated June 1949; Approximate Cost per Unit, $425.00 October 1955.

REFERENCE DATA AND LITERATURE:

TO 33D5-9-9-1 (Operation and Service Instructions).
TO 33D5-9-9-3 (Overhaul Instructions).
TO 33D5-9-9-4 (Illustrated Parts Breakdown).

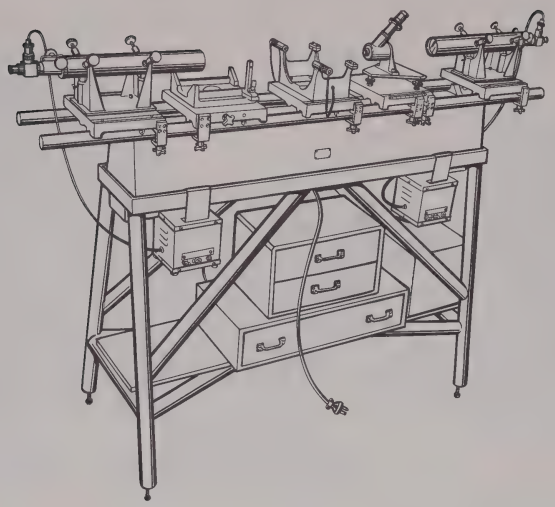
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weigh Packe (Lbs.
			H	W	D	
1	Head End Focal Length Scope (General Mills TSY-7001)	0.22	6	8	8	6

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weigh (Lbs.
				H	W	D	
1	Head End Focal Length Scope (General Mills TSY-7001)	Metal	9CGZ-TSY-7001	4	6	6	2

OPTICAL BENCH
Tool No. TSY-7018
(General Mills, Inc.)



FUNCTIONAL DESCRIPTION:

A general purpose unit designed to provide a means for focusing the objective and reticle assembly and for adjusting the derotation prism assembly of the type Y-2 and Y-4 Horizontal Periscopic Bomb Sights.

RELATIONSHIP TO OTHER EQUIPMENT:

MECHANICAL DESCRIPTION:

Physical Description: A welded steel table supports the base assembly at working height. Two accurately aligned guide rails form ways upon which the various holders are placed for supporting the telescopes, a microscope, and components of the bomb sight under test. Two power units supply the required direct current low voltage for operating the arc lamps. Cabinets are mounted on the table assembly for storage of associated equipment when not in use. The component of the bomb sight under test is placed on a holder. By focusing a spot of light produced by an arc lamp through a pre-focused telescope, an indication of the accuracy of the component is shown by the position and size of the spot of light.

Power Supply: 115 volts, AC, 60 cycles per second required for the arc lamp.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-112257-5		
PROCUREM'T INFO.: AN-D-17			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19	
- Electronics Test Equipment - General Mills TSY-7018			

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

OPTICAL BENCH
Tool No. TSY-7018
(General Mills, Inc.)

MANUFACTURERS' OR CONTRACTORS' DATA:
General Mills, Inc., Mechanical Division, 400 Second Avenue, South Minneapolis, Minnesota; Contract No. AF 33(038)14786.

TUBE COMPLEMENT:
2 JAN-117Z6GT (in power unit).

REFERENCE DATA AND LITERATURE:
TO 33D5-9-11-1 (Operation and Service Instructions).
TO 33D5-9-11-3 (Overhaul Instructions).
TO 33D5-9-11-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Optical Bench General Mills Tool No. TSY-7018					815

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Optical Bench General Mills Tool No. TSY-7018		7CAD-112257-5	52	76	22.5	
1	Mounting Bracket			3-5/8	6-1/2	5	
1	Holding Block						
2	Table Assy.						
2	Lamp						
3	Holder Assy.						
2	Light and Power Supply						
2	Telescope Assy.						
1	Microscope Assy.						

FIXTURE, LIGHT TRANSMISSION CHECK
Part No. TSY-7060
(General Mills, Inc.)

FUNCTIONAL DESCRIPTION:

A portable fixture which is used to check the light transmission efficiency of the type Y-4 Horizontal Periscopic Bombsight. The fixture is assembled to the bombsight and the two are mounted on the TSY-7026 Positional Accuracy Test Fixture. The fixture is intended for use in a repair depot.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The components of the fixture are carried in a wood cabinet. During the test period they operate in the following manner: An adapter holds a projector in line with the optical centerline of the periscope at the periscope eyepiece. A dome cover, used to enclose the dome of the bombsight and exclude extraneous light, has a hole at which a photoelectric cell is mounted. The cell is connected to a microammeter to observe the relative light intensity. A con-

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-291613-5		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19	
	- Electronics Test Equipment -	Gen. Mills TSY-7060	

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

FIXTURE, LIGHT TRANSMISSION CHECK
Part No. TSY-7060
(General Mills, Inc.)

ELECTROMECHANICAL DESCRIPTION: (Continued)

stant voltage transformer supplies voltage to the projector to avoid power variation which would effect the light output of the projector. To determine light transmission efficiency, the following procedure is established: (a) an adapter and filter assembly, and a projector aperture are installed on the projector. The photocell is held to the adapter and the microammeter reading is recorded; (b) a viewer assembly is then set in the hole in the dome cover and the projector energized and adjusted until a bright spot of light appears on the viewer assembly, concentric with the etched circles. The viewer assembly is then replaced by the photocell assembly and the microammeter is read again, and the reading recorded. The light transmission efficiency is calculated according to the following formula:

$$\text{Light Transmission Efficiency} = \frac{\text{Microammeter Reading (b)}}{\text{Microammeter Reading (a)}} \times \text{Filter Factor}$$

Power Supply: 115 volts, AC, 60 cycles per second, single phase.
Meter Range: 0 to 100 microamperes, DC; ±0.5% accuracy.

MANUFACTURERS' OR CONTRACTORS' DATA:

General Mills, Inc., Mechanical Division, 400 Second Avenue, South Minneapolis, Minnesota; Contract Nos. AF 33(038)14786 and AF 33(038)24004; June 1950; Approximate Cost per Unit, $780.00.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-9-19-1 (Operation, Service, Overhaul Instructions).
TO 33D5-9-19-4 (Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Fixture, Light Transmission Check (General Mills TSY-7060)	11.34	27	33	22	110

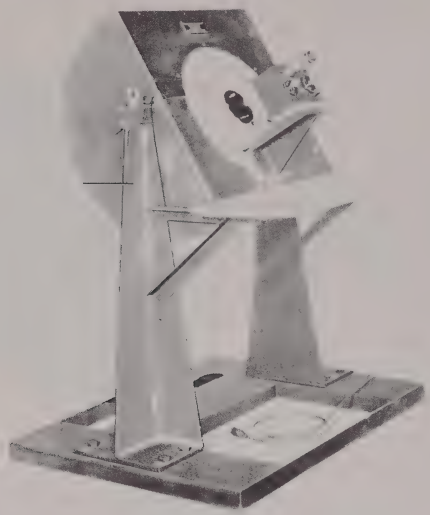
FIXTURE, LIGHT TRANSMISSION CHECK
Part No. TSY-7060
(General Mills, Inc.)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Light Transmission Check (General Mills TSY-7060)	Wood	7CAD-291613-5	20-5/8	17	16	47-1/2
	Including:						
1	Dome Cover						4
1	Adapter Assembly						2
1	Viewer Assembly						2
1	Photo Cell			2-1/2 dia.		1	1/2
1	Microammeter			5	4	2	3
1	Transformer			6	5	8	15
1	Projector			6	5	10	5
1	Projector Aperture						1
						Total:	70

19.1 COLLIMATION EQUIPMENT

FIXTURE, COLLIMATOR ASSEMBLY
Part No. E 33501
(Eastman Kodak Company)



FUNCTIONAL DESCRIPTION:

The collimator assembly is a prime component of the prism head test fixture which is used to check the accuracy of the prism head assembly of the Y-3 Vertical Periscopic Bombsight. By means of an array of 29 separate collimator assemblies, this equipment determines if the accuracy of the angular transmission of the line-of-sight through a prism head assembly is within required limits before assembly into the Y-3 Bombsight.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Characteristics: The collimator array consists of 29 separate collimator assemblies with their axes set at 13°20' apart. The collimators are arranged in two radial sweeps perpendicular to each other. Target reticle assemblies, attached behind each collimator, display various patterns when illuminated by flourescent lamps. The flourescent lamps are mounted in a sheet-metal lamp housing. A glass dome separates the collimator assemblies from the prism head being tested to simulate sight installation.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-294850		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	19.1
- Electronics Test Equipment -			Eastman E 33501

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

FIXTURE, COLLIMATOR ASSEMBLY
Part No. E 33501
(Eastman Kodak Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

During one revolution of the 27-speed prism head drive shaft, the line-of-sight angle travels an angle of 13°20'. Each of the collimators has five patterns spaced 2°40' apart with vernier scales for reading to the nearest 0.2 mil. During testing, the line-of-sight moves through intervals of 2°40'. By using the collimator patterns as references, the following checks may be performed on the prism head assembly: (1) leveling the lateral of the line-of-sight; (2) final adjustment of lateral and elevation prism stops; (3) checking of the plumb travel error; (4) angular transmission check; (5) cradle versus lateral check.

Power Supply: 115 volts, AC, 60 cycles per second, single-phase.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eastman Kodak Company, 343 State Street, Rochester, New York; Contract No. AF 33(038)14792.

TUBE COMPLEMENT:

None.

REFERENCE DATA AND LITERATURE:

TO 33D5-9-34-3 (Operation and Service Instructions).
TO 33D5-9-34-4 (Illustrated Parts Breakdown).

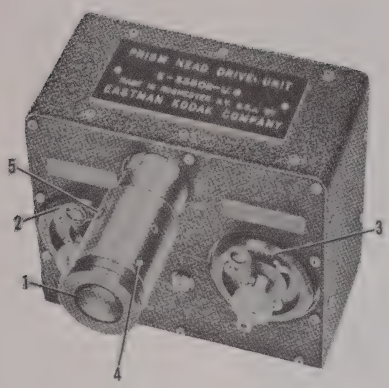
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Fixture, Collimator Assembly Eastman E 33501	94	60	45	60	1100

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Collimator Assembly Eastman E 33501		7CAD-294850	52	38	54	950

FIXTURE, DRIVE UNIT
Part No. E 33502
(Eastman Kodak Company)



1-Telescopic Eyepiece
2-Calibrated Dial
3-Calibrated Dial
4-Eyepiece Setscrew
5-Reticle Centering Screw

FUNCTIONAL DESCRIPTION:

The drive unit is a prime component of the prism head test fixture which is used to check the accuracy of the prism head assembly of the Y-3 Vertical Periscopic Bombsight. This equipment drives the head assembly under test precisely between the collimator stations of the collimator assembly with which it is used, thus simulating the operation of a complete bombsight in the aircraft. A telescope on the drive unit takes the place of the bombsight optical system.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Characteristics: The drive unit is composed of a pair of zero backlash gear trains which manually rotate the elevation and lateral scanning prisms of the head assembly. A built in telescopic eyepiece locates the line-of-sight on the desired target reticle. The manual control knobs have calibrated dials with vernier scales for accurate measurement of rotation.

Power Supply: 115 volts, AC, 60 cycles per second, single phase.

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-273990		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.:	19.1
- Electronics Test Equipment -			Eastman E 33502

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

FIXTURE, DRIVE UNIT
Part No. E 33502
(Eastman Kodak Company)

MANUFACTURERS' OR CONTRACTORS' DATA:
Eastman Kodak Company, 343 State Street, Rochester, New York; Contract No. AF 33(038)14792.

TUBE COMPLEMENT:
None.

REFERENCE DATA AND LITERATURE:
TO 33D5-9-34-3 (Operation and Service Instructions).
TO 33D5-9-34-4 (Illustrated Parts Breakdown).

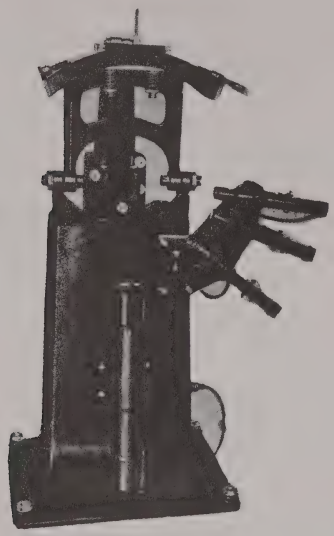
SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Fixture, Drive Unit (Eastman E 33502)		7CAD-273990	7	7	11	35

DRIFTMETER COLLIMATOR
Part No. 13021-1-B
(Eclipse-Pioneer Division of Bendix Aviation Corporation)



FUNCTIONAL DESCRIPTION:

A general purpose instrument used to perform optical calibration of driftmeters. Calibration is accomplished by a zero collimator and three angular collimators.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The instrument is comprised of a test stand with a sliding shoe at the top, a driftmeter bracket, a zero collimator, three angular collimators and brackets to hold and adjust these components. The shoe includes a lateral adjustment which tilts the shoe and the instrument backward or forward, and a radial adjustment which permits shifting the shoe from side to side along the track of the instrument bracket. The lateral and radial adjustments are provided to align the principal axis of the driftmeter optical system with the zero collimator during the process of driftmeter calibration. The zero collimator is provided with tilting and rotating adjustments used to bring the colli-

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.		(ASO)R88PR-13021-1A	7 CAD-209000
PROCUREM'T INFO.: Drawing No. 13021-1-B			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19.1	
- Electronics Test Equipment - E.-P. 13021-1-B			

DRIFTMETER COLLIMATOR
Part No. 13021-1-B
(Eclipse-Pioneer Division of Bendix Aviation Corporation)

ELECTROMECHANICAL DESCRIPTION: (Continued)

mator into true optical vertical alignment. A source of light is provided with the collimator and is located on the side of the instrument.

Power Supply: 110 volts, AC, 60 cycles per second.

Focal Length:

Angular Collimator: 250 millimeters.

Zero Collimator: 508 millimeters.

MANUFACTURERS' OR CONTRACTORS' DATA:

Eclipse-Pioneer Division, Bendix Aviation Corporation, 43 Williams Avenue, Teterboro, New Jersey.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

TO33D2-6-51-3 (Instruction and Parts Breakdown).

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Driftmeter Collimator Eclipse-Pioneer 13021-1-B	metal		64	25-1/2	30	1000
1	Column QB 73071-1						
1	Bracket, Adjusting Vertical QB 73033-1						

(Continued)

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Driftmeter Collimator Eclipse-Pioneer 13021-1-B					

DRIFTMETER COLLIMATOR
Part No. 13021-1-B
(Eclipse-Pioneer Division of Bendix Aviation Corporation)

EQUIPMENT SUPPLIED: (Continued)

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Bracket, Pivot QB 73032-1						
1	Bracket, Instrument QB 73053-1						
1	Block, Vertical Adjusting QB 75392-1						
1	Shoe, Top Sliding QB 73049-1						
1	Shoe, Lower QB 75384-1						
1	Collimator and Mounting Assembly QB 75410-1						
1	Bracket, Collimator QB 74378-1						
3	Collimator Assembly QB 75359-1						
1	Bracket, Main Collimating Clamp QB 75386-1						
1	Telescope M-512 QB 76201-1						

COLLIMATOR
Part No. T-101000
(Sperry Gyroscope Company)

FUNCTIONAL DESCRIPTION:

This equipment is required to align the periscope of the Y-1 or Y-2 Periscopic Bombsight and the Periscopic Bombsight Stabilizer B-1 after they are installed in the aircraft. The collimator is used to determine: (1) that the line of sight of the Y-1 or Y-2 Periscopic Bombsight periscope is true vertical when the aircraft is level; and (2) that the vertical axis of the Periscopic Bombsight Stabilizer B-1, and the principal axis of the periscope maintain a fixed position in azimuth with respect to each other.

RELATIONSHIP TO OTHER EQUIPMENT:

MECHANICAL DESCRIPTION:

Physical Description: The collimator assembly is a tripod mounted, medium power, bi-directional telescope, containing dark-line and illuminated bright-line reticles.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-207550		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commerical	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19.1	
- Electronics Test Equipment - Sperry Part No. T-101000			

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

COLLIMATOR
Part No. T-101000
(Sperry Gyroscope Company)

MECHANICAL DESCRIPTION: (Continued)

It has its own internal lighting circuit.

In order to establish the perpendicularity of the periscope, the collimator provides a reference line of sight which is true vertical. This reference line of sight is established by making it perpendicular to a liquid surface (mercury). The perpendicularity of the line of sight of the periscope may be checked by comparing its line of sight with that of the collimator reference.

The relative positions of the stabilizer and the principal axis of the periscope may also be checked. This may be accomplished by rotating the collimator telescope approximately 90° from the position necessary to check the perpendicularity of the periscope and aligning the telescope parallel to the roll axis of the stabilizer. The line of sight of the periscope is also rotated 90°. The image seen through the collimator telescope should be the same as that seen through the periscope, if the alignment between the stabilizer and periscope is proper.

Power Supply: Two Army type Batteries (BA-30, 1-1/2-volt dry cell) supply power for the light source. Whenever it is undesirable to use the batteries, a special adapter is inserted into the battery receptacle (instead of the two batteries) and connected to a 27-volt power source.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sperry Gyroscope Company, Great Neck, Long Island, New York.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

TO 33D5-9-7-1 (Operation and Service Instructions).
TO 33D5-9-7-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

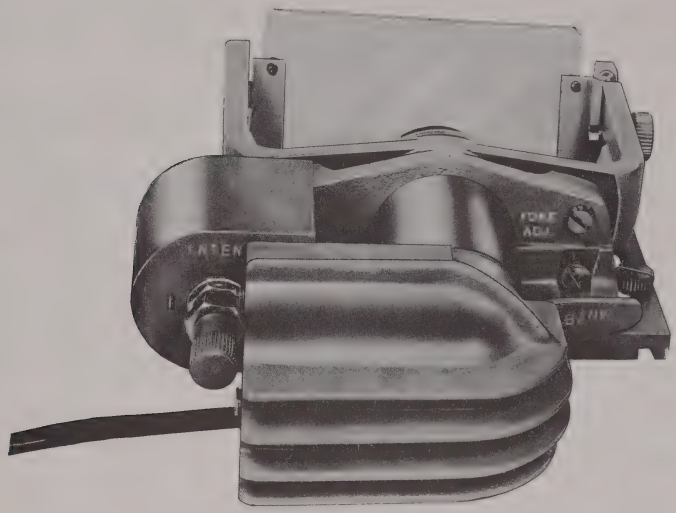
No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
1	Collimator Transit Case Assembly Sperry Part No. T-101000	2.85	26	10	19	
1	Tripod Transit Bag (In Box)	4.3	44	13	13	
Sperry Part No. T-101000 - Electronics Test Equipment -						

COLLIMATOR
Part No. T-101000
(Sperry Gyroscope Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Collimator Transit Case Sperry Part No. T-101000	Metal	7CAD-207550	24	6	14	
1	Tripod Transit Bag	Can-vas		37	7 dia.		
1	Collimator Head						
1	Tripod Stand						
2	Tripod Head Extension						
1	Support Head						
1	Rubber Shield For Eyepiece						
1	Mercury Leveling Cell						
1	Stabilizer Level						
1	Spare Lamp Receptacle						
						Total:	60

OPTICAL TARGET TESTER
(OPTICAL SIGHT TESTER)
Part No. 1000013
(Sperry Gyroscope Company)



FUNCTIONAL DESCRIPTION:

This instrument is a special purpose equipment used to test the A-4 Sight Head. The tester affords a means of checking the size, movements, and positions of the A-4 sight center dot with respect to a calibrated reticle image. The equipment may be used either aboard aircraft or in the field to test the A-4 Sight Head, a part of the type A-4 Gyro Computing Sight (Gun-Bomb-Rocket). When used in the field it operates as an accessory of the Flyaway A-4 Mockup No. 1000109.

RELATIONSHIP TO OTHER EQUIPMENT:

ELECTROMECHANICAL DESCRIPTION:

Physical Description: The equipment consists of the following:

(1) a reticle housing and a rheostat assembly which contains a variable intensity light source.

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.			
STOCK NOS.	7CAD-807685		
PROCUREM'T INFO.:			
PROCUREM'T COG.:		DESIGN COG.: Commercial	
F.I.I.N.:		FUNCTIONAL CLASS. NO.: 19.1	
- Electronics Test Equipment -Sperry Part No. 1000013			

This project was supported by the USAF on Contract AF 33(600)28276 and monitored by WADC, ARDC - Carl L. Frederick, Bethesda, Md. - Multilithed in U. S. A.

OPTICAL TARGET TESTER
(OPTICAL SIGHT TESTER)
Part No. 1000013
(Sperry Gyroscope Company)

ELECTROMECHANICAL DESCRIPTION: (Continued)

(2) a reticle lens assembly which contains the condenser lens, reticle, and projector lens.

(3) a yoke and mirror assembly which contains a half-silvered mirror. Diverging light rays are focused through the reticle by the condenser lens.

The reticle image is inverted and projected on the silvered side of the mirror. The image is then reflected to the aircraft combining glass (or to the combining glass of the A-4 Mockup No. 1000109). The sight center dot from the Sight Head is transmitted through the mirror of the tester to the combining glass.

The reticle image from the tester is held in a fixed position on the combining glass. The sight center dot is caused to move at rates and in directions determined by the response of the sight head to its controls. The calibrated reticle image, together with the sight center dot, provides a means of checking the control response and accuracy of the A-4 Sight Head.

Power Supply: 28 volts, DC, required for the light source. This is supplied by the equipment under test.

MANUFACTURERS' OR CONTRACTORS' DATA:

Sperry Gyroscope Company, Great Neck, Long Island, New York.

TUBE COMPLEMENT:

REFERENCE DATA AND LITERATURE:

TO 33D5-9-25-1 (Operation and Service Instructions).
TO 33D5-9-25-4 (Illustrated Parts Breakdown).

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
Sperry Part No. 1000013 - Electronics Test Equipment -						

OPTICAL TARGET TESTER
(OPTICAL SIGHT TESTER)
Part No. 1000013
(Sperry Gyroscope Company)

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Optical Target Tester Sperry Part No. 1000013	Metal	7CAD-807685				
1	Transit Case Assembly (with instruction and list cards, and spare lamps)	Metal		4-3/8	10-5/8	10	
						Total:	3

19.2 PHOTOGRAPHIC TEST EQUIPMENT

SYNCHROTESTER
MODEL ST-2
(Heiland Division of Minneapolis-Honeywell Regulator Co.)

FUNCTIONAL DESCRIPTION:

A portable, general purpose electronic instrument designed to test the synchronization of camera shutters in conjunction with flash lamp operation. The equipment measures the elapsed time between the application of current to fire a flash lamp and the opening of the shutter blades. Shutter setting accuracy studies may also be performed from the highest speed down to one-eighteenth of a second. Results are indicated by a dial calibrated in milliseconds or one-tenth millisecond depending upon the range selected.

RELATIONSHIP TO OTHER EQUIPMENT:

Replacement for Synchrotester Heiland ST-1.

ELECTROMECHANICAL DESCRIPTION:

Circuit Information: The equipment employs a flash tube which is viewed through either the camera focal plane or the lens shutters. The flash tube provides a stop-action view of shutter position at the time of flash, thereby permitting

(Continued)

	AIR FORCE	NAVY	ARMY
TYPE CLASS.		Standard	
STOCK NOS.			
PROCUREM'T INFO.:			
PROCUREM'T COG.: Navy		DESIGN COG.: Commercial	
F.I.I.N.: 6760-597-2521		FUNCTIONAL CLASS. NO.: 19.2	
- Electronics Test Equipment -			Heiland ST-2

SYNCHROTESTER
MODEL ST-2
(Heiland Division of Minneapolis-Honeywell Regulator Co.)

ELECTROMECHANICAL DESCRIPTION: (Continued)

precise adjustment of shutter openings. The equipment circuitry includes a capacitor which discharges through the flash tube when the shutter of the camera under test is tripped, a load compensating circuit to simulate the flash gun circuit, a calibration oscillator to check equipment timing circuit accuracy, circuits employing grid controlled rectifier tubes to provide a variable time delay and a regulated power supply.

Power Supply: 115 volts, AC, 60 cycles per second.
Time Delay Range: 0 to 6 and 0 to 60 milliseconds.
Flash Duration: Less than 1 millisecond.
Equipment Warmup Time: 10 to 30 minutes.

MANUFACTURERS' OR CONTRACTORS' DATA:

Heiland, Division of Minneapolis-Honeywell Regulator Company, 130 East 5th Street, Denver 9, Colorado; Approximate Cost per Unit, $250.00.

TUBE COMPLEMENT:

2 5Y3GT, 2 2050, 1 OD3/VR-150.

REFERENCE DATA AND LITERATURE:

Manufacturer's Instruction Book.

EQUIPMENT SUPPLIED:

Quant. Per Eq'pt	Name and Nomenclature	Case Mat'l	Stock Numbers (USAF) (Navy) (Army)	Overall Dimensions (inches)			Weight (Lbs.)
				H	W	D	
1	Synchrotester Heiland ST-2			6	5	10	9
1	Cable, Shutter			24 long			

SHIPPING DATA:

No. of Boxes	Contents & Identification	Volume (Cu. Ft.)	Overall Dimensions (inches)			Weight Packed (Lbs.)
			H	W	D	
	Synchrotester, Heiland ST-2					

COMPLETE ALPHA-NUMERICAL INDEX
FOR VOLUMES 1 THROUGH 19

ALPHA-NUMERICAL INDEX

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Aero 10B	Flight Circuit Tester	10.4.5	191
Aero 11A	Flight Circuit Tester	10.4.5	193
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AN/APM-3	Radar Test Set	10.1.3	197
AN/APM-3A	Radar Test Set	10.1.3	201
AN/APM-12	Test Bench Assembly	10.4.4	169
AN/APM-66	Radar Test Set	10.4.11	321
AN/APM-67	Radar Test Set	10.1.3	205
AN/ARM-1	Radio Test Set	10.3.4	569
AN/ARM-6	Radio Test Set	14.3.2	153
AN/ARM-7	Radio Test Set	14.3.1	51
AN/ARM-22	Test Set	10.4.11	325
AN/ARM-32	Test Set, Radio	10.4.5	197
AN/ASM-2A	Gyroscope Test Set	10.2.1	101
AN/AXT-2	Radio Transmitting Set	10.4.6	207
AN/BDQ-1A	Radiation Monitoring Set	9.1	551
AN/BDQ-3	Radiation Monitoring Set	9.1	555
AN/FMQ-2A	Radiosonde Receptor	10.4	9
AN/FRM-3	Frequency Calibrator Set	13.4	437
AN/GPM-4	Computer Test Set	10.4.2	95

Designation	Name	Functional Classificatio	
AN/GPM-5	Computer Test Set	99	10.4.2
AN/GPM-6	Commutator Test Set	245	10.2.5
AN/GPM-7	Indicator Test Set	383	10.3
AN/GPM-8	Servo Test Set	49	10.4.1
AN/GPM-9	Power Supply Group	611	11.6
AN/GPM-10	Radar Test Set	387	10.3
AN/GPM-11	Indicator Test Set	149	6.1.1
AN/GPM-12	Test Adapter	391	10.3
AN/GPM-13	Test Adapter	395	10.3
AN/GPM-14	Boresighting Set	293	10.4.8
AN/GPM-15	Signal Generator	69	4.1.2
AN/GRM-4	Signal Generator	73	4.1.2
AN/GSM-2	Electrical Power Test Set	547	10.3.1
AN/PDR-10A	Radiac Set	559	9.1
AN/PDR-10C	Radiac Set	563	9.1
AN/PDR-18B	Radiac Set	567	9.1
AN/PDR-27H	Radiac Set	571	9.1
AN/PDR-45	Radiac Set	575	9.1
AN/PDR-49	Radiac Set	579	9.1
AN/PRM-1A	Radio Test Set	47	5.1.3
AN/PRM-10	Test Oscillator Set	113	10.1.2
AN/PRM-15	Multimeter	197	1.3.1.2
AN/PRM-16	Multimeter	201	1.3.1.2
AN/PSM-1A	Insulation Test Set	153	6.1.1
AN/PSM-2A	Insulation Test Set	155	6.1.1
AN/PSM-3	Voltmeter	85	1.1.2
AN/PSM-3(XA-2)	Voltmeter	87	1.1.2

Designation	Name	Functional Classification
AN/PSM-4	Multimeter	1. 3. 2. 1 227
AN/PSM-6	Multimeter	1. 3. 2. 1 231
AN/PTM-2	Electrical Cable Test Set	10. 4. 7 221
AN/PTM-3	Telephone Test Set	10. 4. 7 223
AN/PTM-4	Electrical Cable Test Set	10. 4. 7 227
AN/SPM-4	Frequency-Power Meter	10. 1. 1 85
AN/SPM-6	Calibrator Set, Range	8. 1 443
AN/TPM-8	Servo Test Set	10. 4. 1 53
AN/TRM-1	Test Set, Radio	10. 1. 4 361
AN/TRM-3(XN)	Radio Test Set	10. 1. 2 115
AN/TSM-15	Test Set, Crystal Unit Quartz	10. 2. 9 349
AN/TXC-1B	Facsimile Set	10. 4. 7 229
AN/UPA-1	Detector-Amplifier Assembly	7. 1. 3 391
AN/UPM-1	Radar Maintenance Equipment	10. 1. 3 209
AN/UPM-1A	Radar Maintenance Equipment	10. 1. 3 215
AN/UPM-1B	Radar Maintenance Equipment	10. 1. 3 221
AN/UPM-2	Wavemeter Test Set	2. 2. 3 311
AN/UPM-7	Radar Test Set	10. 4. 11 329
AN/UPM-8	Radar Test Set	10. 4. 11 335
AN/UPM-9(XN-2)	Radar Test Set	10. 1. 3 227
AN/UPM-10	Radar Test Set	10. 1. 3 231
AN/UPM-10A	Radar Test Set	10. 1. 3 235
AN/UPM-11	Range Calibrator Set	8. 1 447
AN/UPM-11A	Range Calibrator Set	8. 1 451
AN/UPM-12	Radar Test Set	10. 1. 8 403
AN/UPM-14	Radar Test Set	10. 1. 3 239
AN/UPM-15	Pulse Generator Set	4. 3. 2 513

Designation	Name	Functional Classification
AN/UPM-16	Electrical Cable Test Set	341 6.3
AN/UPM-17	Spectrum Analyzer Set	209 3.4.4
AN/UPM-18	Radar Test Set	121 12.2.3
AN/UPM-24	Radar Test Set	273 6.2.1
AN/UPM-25	Radar Test Set	243 10.1.3
AN/UPM-30	Radar Test Set	151 2.2.2
AN/UPM-33	Radar Test Set	213 3.4.4
AN/UPM-34	Antenna Test Set	431 2.4.2
AN/UPM-35	Computer Test Set	103 10.4.2
AN/UPM-36	Signal Comparator	447 2.5.2
AN/UPM-40	Calibrator Set, Range	455 8.1
AN/UPM-41	Radar Test Set	417 10.1.10
AN/UPM-44	Radar Test Set	247 10.1.3
AN/UPM-44(XN-1)	Radar Test Set	253 10.1.3
AN/UPM-46	Test Oscillator	419 4.2.2
AN/UPM-50	Electrical Dummy Load	167 12.3.1
AN/UPM-55	Pulse Generator	517 4.3.2
AN/UPM-56	Radar Test Set	257 10.1.3
AN/UPM-66	Test Set, Radar	421 10.1.10
AN/UPM-84	Spectrum Analyzer	219 3.4.4
AN/UPM-93	Test Set, Electrical Power	387 10.1.5
AN/UPM-101	Radar Test Set	501 4.3.1
AN/UPM-108	Standing-Wave Indicator	323 6.2.2
AN/URM-3	Radio Interference Measuring Set	51 5.1.3
AN/URM-6	Radio Test Set	55 5.1.3
AN/URM-7	Radio Interference Measuring Set	61 5.1.3
AN/URM-9(XW)	Shielding Test Set	37 4.1.1
AN/URM-11	Test Kit	7 10.2

Designation	Name	Functional Classification	
AN/URM-12	Voltage Point Test Set	1. 1. 5	119
AN/URM-13	Dummy Load Set	14. 3. 2	155
AN/URM-14	Microphone Simulator Set	1. 1. 2	91
AN/URM-15	Signal Generator Set	4. 1. 2	77
AN/URM-17	Radio Test Set	5. 1. 3	65
AN/URM-18	Frequency Calibrator-Meter Set	13. 2	421
AN/URM-19(XW)	Summation Bridge	14. 3. 1	53
AN/URM-20	Summation Bridge	14. 3. 1	57
AN/URM-21(XW)	Summation Bridge	14. 3. 1	61
AN/URM-22	Summation Bridge	14. 3. 1	65
AN/URM-23	Summation Bridge	14. 3. 1	69
AN/URM-24	Summation Bridge	14. 3. 1	73
AN/URM-25	RF Signal Generator Set	4. 1. 2	81
AN/URM-25A	RF Signal Generator Set	4. 1. 2	85
AN/URM-25B	RF Signal Generator Set	4. 1. 2	89
AN/URM-25E	RF Signal Generator	4. 1. 2	93
AN/URM-25F	RF Signal Generator	4. 1. 2	97
AN/URM-26	RF Signal Generator Set	4. 1. 2	101
AN/URM-30	Radio Test Set	10. 1. 4	365
AN/URM-32	Frequency Meter	2. 1. 1	35
AN/URM-33	Signal Generator	4. 1. 2	105
AN/URM-34	Signal Generator	4. 1. 2	109
AN/URM-35	Signal Generator	4. 1. 2	113
AN/URM-36	Signal Generator	4. 1. 2	117
AN/URM-38	Audio Level Meter	5. 5	125
AN/URM-39	Impedance Bridge	6. 1. 5	231
AN/URM-41	Field Intensity Meter	5. 1. 3	69

Designation	Name	Functional Classification
AN/URM-43	RF Wattmeter	77 14.3.1
AN/URM-43A	Wattmeter	81 14.3.1
AN/URM-44	Radio Test Set	121 4.1.2
AN/URM-45	Voltmeter	109 1.1.3
AN/URM-47	Radio Interference Measuring Set	75 5.1.3
AN/URM-48	Signal Generator	125 4.1.2
AN/URM-49	Signal Generator	129 4.1.2
AN/URM-52	Signal Generator	133 4.1.2
AN/URM-59	Electrical Dummy Load	169 12.3.1
AN/URM-60	Directional Coupler	325 12.3.3
AN/URM-61	Signal Generator	137 4.1.2
AN/URM-61A	Signal Generator	141 4.1.2
AN/URM-62	Electrical Dummy Load	173 12.3.1
AN/URM-63	Electrical Dummy Load	175 12.3.1
AN/URM-64	Signal Generator	145 4.1.2
AN/URM-64A	Signal Generator	149 4.1.2
AN/URM-68	Electrical Dummy Load	177 12.3.1
AN/URM-70	Signal Generator	153 4.1.2
AN/URM-75	Generator, Sweep	421 4.2.2
AN/URM-79	Frequency Meter	39 2.1.1
AN/URM-80	Frequency Meter	43 2.1.1
AN/URM-81	Frequency Meter	45 2.1.1
AN/URM-96	Bi-Directional Power Monitor	49 14.3
AN/URM-98	Wattmeter	83 14.3.1
AN/USM-3B	Test-Tool Set	57 10.1
AN/USM-6	Impedance Measuring Test Set	275 6.2.1
AN/USM-7	Impedance Measuring Test Set	279 6.2.1
AN/USM-11	Impedance Measuring Test Set	283 6.2.1

Designation	Name	Functional Classification	
AN/USM-14	Impedance Measuring Test Set	6.2.1	287
AN/USM-16	Signal Generator Set	4.1.2	157
AN/USM-17	Synchro Test Set	10.2.2	147
AN/USM-18	Resistance Bridge Test Set	6.1.1	157
AN/USM-20	Electrical Power Test Set	10.3	399
AN/USM-21	Ohmmeter	6.1.1	159
AN/USM-22	Wavemeter	2.2.2	155
AN/USM-23	Electron Tube Test Set	10.2.7	275
AN/USM-24	Oscilloscope	3.2	63
AN/USM-24A	Oscilloscope	3.2	67
AN/USM-24C	Oscilloscope	3.2	73
AN/USM-24D	Oscilloscope	3.2	79
AN/USM-25A/B	Oscilloscope	3.2	85
AN/USM-26	Frequency Meter	2.4.2	435
AN/USM-27A	Signal Generator	4.3.2	521
AN/USM-29	Frequency Meter	2.1.3	123
AN/USM-31	Electron Tube Test Set	10.2.7	279
AN/USM-32	Oscilloscope	3.2	89
AN/USM-33	Multimeter	1.3.2.3	273
AN/USM-34	Multimeter	1.3.1.1	183
AN/USM-37	Standing-Wave Indicator	6.2.1	291
AN/USM-38	Oscilloscope	3.2	95
AN/USM-39	Computer Test Set	10.4.2	107
AN/USM-40	Electrical Dummy Load	12.3.1	179
AN/USM-44	Signal Generator	4.1.2	161
AN/USM-47	Signal Generator	4.1.2	165

Designation	Name	Functional Classification
AN/USM-48	Signal Generator	169 4.1.2
AN/USM-50	Oscilloscope	99 3.2
AN/USM-50B	Oscilloscope	103 3.2
AN/USM-51	Megger Ground Tester	161 6.1.1
AN/USM-52	Insulation and Resistance Tester	163 6.1.1
AN/USM-88	Test Set, Electrical Cable	345 6.3
AN/USM-105(V)	Oscilloscope	107 3.2
AS-23/AP	Antenna Assembly	55 11.1.1
AT-39/AP	Horn Antenna	57 11.1.1
AT-49B/APR-4	Antenna	59 11.1.1
AT-67/AP	Antenna	61 11.1.1
AT-68/UP	Antenna	63 11.1.1
AT-88/U	Probe Antenna	93 11.1.2
AT-152/U	Test Antenna	65 11.1.1
AT-153/U	Test Antenna	67 11.1.1
AT-154/U	Test Antenna	69 11.1.1
AT-155/U	Test Antenna	71 11.1.1
AT-156/U	Test Antenna	73 11.1.1
AT-157/U	Test Antenna	75 11.1.1
AT-158/U	Test Antenna	77 11.1.1
AT-159/U	Test Antenna	79 11.1.1
AT-183A/AP	Antenna	81 11.1.1
AT-190A/AP	Antenna	83 11.1.1
AT-191A/AP	Antenna	85 11.1.1
AT-219/APR-9	Antenna	87 11.1.1

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BC-342-N	Radio Receiver	10.4 13
BC-344-D	Radio Receiver	10.4 17
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BC-376-B	Test Oscillator	10.1.2 121
BC-376-C	Test Oscillator	10.1.2 123
BC-376-D	Test Oscillator	10.1.2 125
BC-376-E	Test Oscillator	10.1.2 127
BC-376-F	Test Oscillator	10.1.2 129
BC-376-G	Test Oscillator	10.1.2 131
BC-376-H	Test Oscillator	10.1.2 133
BC-376-J	Test Oscillator	10.1.2 135
BC-638-A	Frequency Meter	4.2.2 425
BC-906-A	Frequency Meter	2.2.3 315
BC-906-B	Frequency Meter	2.2.3 319
BC-906-C	Frequency Meter	2.2.3 323
BC-906-D	Frequency Meter	2.2.3 327
BC-906-E	Frequency Meter	2.2.3 331
BC-914	Test Unit	10.4 21
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BC-929-A	Indicator	10.4.11 339
BC-936-A	Indicator	11.2.4 209
BC-1060-A	Oscilloscope	3.1 23
BC-1066-A	Radio Receiver	2.1.1 53
BC-1066-B	Radio Receiver	2.1.1 55
BC-1077-A	Signal Generator	10.1.3 261

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BC-1201-A	Diode Coupling Head	329 12.3.4
BC-1203-B	Modulator Unit	523 4.3.2
BC-1277-A	Signal Generator	265 10.1.3
BE-67	Test Indicator	11 10.2
BE-77-A, B	Test Indicator	233 10.4.7
C-154/TPS-1B	Control Box	615 11.6
C-412/APS-23	Control Unit	173 10.4.4
C-463/APG-3	Control	401 10.3
C-637/APG-30	Radar Set Control	175 10.4.4
CD-307-A	Cord	351 11.3.1
CD-502	Cord	353 11.3.1
CD-503	Cord	355 11.3.1
CD-505-A	Cord	357 11.3.1
CD-627	Cord	237 11.2.6
CD-663	Cord	239 11.2.6
CD-799	Cord	359 11.3.1
CD-800	Cord	241 11.2.6
CD-935	Cord	361 11.3.1
CD-1099	Cord	243 11.2.6
CD-1100	Cord	245 11.2.6
CD-1101	Cable	247 11.2.6
CD-1102	Cord	363 11.3.1
CD-1103	Cord	249 11.2.6
CD-1104	Cord	251 11.2.6
CD-1106	Cord	365 11.3.1

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CG-55B/U	Cord	11.2.6 255
CG-60/AP	Cord	11.2.6 257
CG-67/MRQ-2	Cord	11.2.6 259
CG-70/MPM-10	Cord	11.2.6 261
CG-71/MPM-10	Cord	11.2.6 263
CG-91/U	Cord	11.2.6 265
CG-92B/U	Cord	11.2.6 267
CG-100/U	Cord	11.2.6 269
CG-107/U	Cord	11.2.6 271
CG-111/TPS-1B	Combination Cable	11.3.1 371
CG-135/UP	Cord	11.2.6 273
CG-136/UP	Cord	11.2.6 275
CG-155/TPN-2	Cord	11.2.6 277
CG-176/AP	Directional Coupler	11.2.4 211
CG-187/TPS-1B	Transmission Line	11.2.6 279
CG-188/TPS-1B	Transmission Line	11.2.6 281
CG-227/CPS-1	Cord	11.2.6 283
CG-228/CPS-1	Cord	11.2.6 285
CG-229/CPS-1	Cord	11.2.6 287
CG-230/CPS-1	Cord	11.2.6 289
CG-231/CPS-1	Cord	11.2.6 291
CG-232/CPS-1	Cord	11.2.6 293
CG-295A/U	Cord	11.2.6 295

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CG-308/U	Transmission Line	301 11.2.6
CG-317/U	Cord	303 11.2.6
CG-373/U	Cord	305 11.2.6
CG-381/U	Cord	307 11.2.6
CG-385/U	Cord	309 11.2.6
CG-409A/U	Cord	311 11.2.6
CG-426A/U	Cord	313 11.2.6
CG-497/U	RF Cable Assembly	315 11.2.6
CG-547A/U	RF Cable Assembly	317 11.2.6
CG-559/U	RF Cable Assembly	319 11.2.6
CG-562/U	RF Cable Assembly	321 11.2.6
CG-566/U	Cable Assembly	323 11.2.6
CG-582/U	RF Cable Assembly	325 11.2.6
CG-620/U	RF Cable Assembly	327 11.2.6
CG-621/U	RF Cable Assembly	329 11.2.6
CG-624/MPM-2	RF Cable Assembly	331 11.2.6
CG-637/U	Waveguide Assembly	343 11.2.7
CN-16A/U	Transformer	75 12.1.4
CN-29/UP	Attenuator	301 12.3.2
CN-32/U	Attenuator	303 12.3.2
CN-34/U	Attenuator	305 12.3.2
CN-42/UP	Attenuator	307 12.3.2
CN-45/UP	Attenuator	97 12.2.1
CN-110/U	Attenuator	309 12.3.2

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CN-169A/U	Fixed Attenuator	12.3.2	313
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CU-108/UP	Test Line Assembly	11.2.6	333
CU-225/U	Directional Coupler	12.3.5	333
CV-52/U	Mixer	12.4	373
CV-301/U	Electronic Frequency Converter	4.1.3	383
CW-224/U	Antenna Shield	12.3.1	181
CX-106/GR	Cable	11.2.6	335
CX-187/APN-3	Cord	11.3.1	375
CX-245/UP	Cord	11.3.1	377
CX-246/UP	Cord	11.3.1	379
CX-247/UP	Cord	11.3.1	381
CX-248/UP	Cord	11.3.1	383
CX-249/UP	Cord	11.3.1	385
CX-250/UP	Cord	11.3.1	387
CX-251/UP	Cord	11.2.6	337
CX-252/UP	Cord	11.3.1	389
CX-253/UP	Cord	11.3.1	391
CX-254/UP	Cord	11.3.1	393
CX-255/UP	Cord	11.3.1	395
CX-256/UP	Cord	11.3.1	397
CX-257/UP	Cord	11.3.1	399
CX-258/UP	Cord	11.3.1	401
CX-259/UP	Cord	11.3.1	403
CX-260/UP	Cord	11.3.1	405

Designation	Name	Functional Classification
CX-261/UP	Cord	407 11.3.1
CX-262/UP	Cord	409 11.3.1
CX-263/UP	Cord	411 11.3.1
CX-337/U	Cable	413 11.3.1
CX-339/TPS-1B	Cord	415 11.3.1
CX-414/CPS-1	Cord	417 11.3.1
CX-434/CPS-1	Cord	419 11.3.1
CX-436/CPS-1	Cord	421 11.3.1
CX-437/CPS-1	Cord	423 11.3.1
CX-468/U	Cord	425 11.3.1
CX-510/TPS-10	Cord	427 11.3.1
CX-516/TPS-10	Cord	429 11.3.1
CX-520/TPS-10	Cord	431 11.3.1
CX-572/CPX	Cord	433 11.3.1
CX-647/CPM-4	Cord	339 11.2.6
CX-648/CPM-4	Cord	341 11.2.6
CX-762/CPM-10	Cord	435 11.3.1
CX-985/U	Cord	437 11.3.1
CX-986/U	Cord	439 11.3.1
CX-1021/ARN-6	Cord	441 11.3.1
CX-1107/U	Cable	443 11.3.1
CX-1108/U	Cable	445 11.3.1
CX-1109/U	Cable	447 11.3.1
CX-1158/U	Special Purpose Cable Assembly	449 11.3.1
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CX-1237/CPN-2A	Special Purpose Cable Assembly	455 11.3.1

Designation	Name	Functional Classification
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CX-1396/U	Wiring Assembly	11.3.1 473
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*Refers to Models A, B, C, D, F, G, H, J, K, L, M, N, O, R, U.

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I-49	Test Set	167 6.1.1
I-49-B	Test Set	169 6.1.1
I-50	Voltammeter	277 1.3.2.3
I-51	Test Set	243 10.4.7
I-61-A, B, C	Test Set	247 10.4.7
I-72-G	Signal Generator	429 4.2.2
I-72-H	Signal Generator	431 4.2.2
I-72-J	Signal Generator	433 4.2.2
I-72-K	Signal Generator	435 4.2.2
I-72-L	Signal Generator	437 4.2.2
I-86-A	Test Unit	141 10.1.2
I-96-A	Signal Generator	439 ~~415~~ 4.2.2
I-99	Test Unit	127 12.2.3
I-100-A	Test Set	13 10.2
I-100-B	Test Set	17 10.2
I-129-B	Frequency Meter Set	131 2.2.1
I-129-BM	Frequency Meter Set	135 2.2.1
I-130-A	Signal Generator	441 4.2.2
I-137-B	Signal Generator	173 4.1.2
I-139-A	Test Set	147 1.2.3
I-142-A	Test Set	251 10.4.7
I-148-A	Test Set	271 6.2
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I-167-A	Multimeter	1. 3. 2. 1 235
I-173-A	Test Set	4. 4. 1 567
I-176	Test Unit	1. 3. 2. 1 237
I-177	Tube Tester	10. 2. 7 283
I-177-A	Tube Tester	10. 2. 7 287
I-177-B	Tube Tester	10. 2. 7 289
I-181-B	Test Set	10. 2. 6 249
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I-196-A	Signal Generator	4. 2. 2 445
I-196-B	Signal Generator	4. 2. 2 447
I-201	Test Unit	1. 3. 2. 3 279
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ID-253/GRD	Azimuth Indicator	10. 3 407

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ID-265/U	Voltage Indicator Probe	95 11.1.2
IE-12-A	Test Equipment	409 10.1.9
IE-17-F	Test Equipment	177 10.4.4
IE-19-A	Test Equipment	413 10.1.9
IE-36	Test Equipment	575 10.3.4
IE-45-A	Test Equipment	525 4.3.2
IE-45-B	Test Equipment	529 4.3.2
IE-56-A	Test Equipment	65 10.1
IE-56-B	Test Equipment	69 10.1
IM-23/U	Slotted Line	295 6.2.1
IM-23A/U	Slotted Line	299 6.2.1
IM-28/U	Slotted Line	301 6.2.1
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LAE-3	RF Signal Generator Equipment	4.1.2	185
LAE-4	RF Signal Generator Equipment	4.1.2	189
LAF	Signal Generator	4.1.2	193
LAF-3	RF Signal Generator Equipment	4.1.2	197
LAG	Signal Generator	4.1.2	201
LS-3	Loudspeaker	11.4.2	571
LT-3080	Test Panel, Servo Motor Assembly	10.4.1	55
LT-3089A	Analyzer, Electron Tube	10.2.7	291
M-358	Adapter	12.3.5	335
M-359	Adapter	11.2.1	117
MA-1	Test Set, Range Servo	10.4.1	59
MC-385-D	Headset Adapter	12.1.4	77
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ME-6B/U	Electronic Multimeter	1.1.1	25
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ME-25A/U	Multimeter	1.3.1.1	187
ME-26/U	Multimeter Meter	1.3.1.2	205
ME-29/U	Ammeter	1.2.3	155
ME-30/U	Voltmeter Meter	1.1.1	31
ME-30A/U	Voltmeter, Electronic	1.1.1	35
ME-32/U	RF Ammeter	1.2.2	139

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ME-63/U	Phase Monitor	249	6.1.8
ME-64/U	Voltmeter	97	1.1.2
ME-65/U	Ammeter	141	1.2.2
ME-67/U	Multimeter	287	1.3.2.3
ME-74/U	Multimeter	177	1.3
ME-75/ARC-21	Multimeter	289	1.3.2.3
ME-82/U	RF Wattmeter	87	14.3.1
MK-20A/UP	Pressurizing Kit	575	11.5
MK-62/AP	Pressurizing Kit	577	11.5
MK-136/ARC-21	Radio Test Kit	233	11.2.5
MT-1164/U	Receiver-Transmitter Maintenance Stand	589	11.5.1
MX-135/AP	Adapter	163	11.2.3
MX-215A/APG	Blower Unit	605	11.5.2
MX-479/ARN-6	Adapter Kit	185	10.4.4
MX-799/APG-3	Boresighting Accessory Kit	297	10.4.8
MX-799A/APG-3	Boresighting Accessory Kit	301	10.4.8
MX-915/U	Test Set Adapter	591	11.5.1
MX-925/U	RF Probe	97	11.1.2
MX-929/U	RF Probe	99	11.1.2
MX-933/U	Test Prod	101	11.1.2
MX-934/U	Test Prod	103	11.1.2
MX-949A/U	Tube Socket Adapter Kit	529	11.3.2
MX-1019/U	RF Probe	105	11.1.2
MX-1028/U	Test Set Adapter	593	11.5.1

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MX-1258/U	Tube Socket Adapter Kit	11.3.2	531
MX-1345/APN-84	Hardware Kit	11.5	581
MX-1381/APM-66	Delay Line	12.3.7	369
MX-1414/GPA-5	Video Pattern Slide	11	41
MX-1415/GPA-5	Video Pattern Slide	11	43
MX-1416/GPA-5	Video Pattern Slide	11	45
MX-1417/U	Adapter, Tube Socket	11.3.2	533
MX-1434/AP	Adapter, Tube Socket	11.3.2	535
MX-2144/U	Probe, Waveguide	14.3.3	157
O-14/FSM-1	Oscillator	10.2.9	353
OAA-2	Radar Test Equipment	2.2.2	195
OAO-2	Radar Test Equipment	2.2.2	199
OBU	Radar Test Equipment	2.2.2	203
OCP-3	Sonar Test Equipment	10.1.3	269
OS-7/U	Oscilloscope Range Calibrator	3.2	111
OS-8A/U	Oscilloscope	3.1	27
OS-8C/U	Oscilloscope	3.1	31
OS-10A/U	Oscilloscope	3.1	35
OS-48/U	Oscilloscope	3.2	115
PP-32/AR	Rectifier Power Unit	11.6	619
PP-81A/CPS-1	Rectifier Power Unit	11.6	621
PP-106/U	Power Supply	11.6	623
R-206A/PR	Radio Receiver	10.4	25
R-270/FRR	Radio Receiver	10.4	27
RA-66-B	Rectifier	11.6	627
RA-69-B	Rectifier	11.6	631
RA-70-B	Rectifier	11.6	633

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RC-54-A	Test Set	579 10.3.4
RC-54-B	Test Set	583 10.3.4
RC-54-C	Test Set	587 10.3.4
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RC-55-B	Test Set	595 10.3.4
RC-55-C	Test Set	599 10.3.4
RC-93-A	Oscillator Test Equipment	449 4.2.2
RC-93-B	Oscillator Test Equipment	451 4.2.2
RC-93-C	Oscillator Test Equipment	453 4.2.2
RD-49/U	Recorder-Milliammeter	181 3.3.3
RP-106/GPH	Signal Data Reproducer	31 10.4
SA-489/U	Switch, Waveguide	361 12.3.6
SA-509/U	Switch, Waveguide	363 12.3.6
SA-511/U	Switch, Waveguide	365 12.3.6
SA-512/U	Switch, Waveguide	367 12.3.6
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SCR-211-J	Frequency Meter Set	75 2.1.1
SG-1/ARN	Signal Generator	205 4.1.2
SG-1A/ARN	Signal Generator	209 4.1.2
SG-6/U	Signal Generator	213 4.1.2
SG-8/U	Noise Generator	569 4.4.1
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SG-13/ARN	Signal Generator	217 4.1.2
SG-18/U	Signal Generator	533 4.3.2
SG-20/U	RF Signal Generator	221 4.1.2
SG-23/U	Interference Generator	581 4.4.3

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SG-28(XW)/U	RF Signal Generator	4.1.2 225
SG-30(XN)/UP	Pulse Generator	4.3.2 535
SG-31/U	RF Signal Generator	4.1.2 229
SG-50(XN-1)/ARN	RF Signal Generator	4.1.2 233
SG-51/U	Interference Generator	4.4.1 571
SG-58A/U	Pulse Generator	10.2.7 295
SG-77(XC-1)/U	Signal Generator	4.1.2 235
SG-91/U	Signal Generator	4.1.2 237
SG-106/MPQ-25	Signal Generator	4.3.3 559
SG-116/DSM-13	Signal Generator	4.5.2 593
SG-142/DPM-1	Generator, Pulse Delay	4.3.2 539
SG-146/U	Signal Generator	4.1.2 239
SM-26/U	Antenna Position Simulator	10.2.2 149
SM-34/CPS-6B	Antenna Position Simulator	11.6 639
SM-65/UP	Radar Signal Simulator	10.1.10 425
T-216/GR	Radio Transmitter	4.1.2 243
TS-1/ARR-1	Test Set	4.2.2 455
TS-2/TG	Test Set	10.4.7 255
TS-3/AP	Test Set	10.1.1 89
TS-3A/AP	Test Set	10.1.1 93
TS-5/AP	Range Calibrator	8.1 465
TS-10/APN	Test Set	8.1 469
TS-10A/APN	Test Set	8.1 473
TS-10B/APN	Test Set	8.1 477
TS-10C/APN	Test Set	8.1 481
TS-12/AP	Standing-Wave Indicator	6.2.1 311

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TS-13/AP	Radio Frequency Test Set	273	10. 1. 3
TS-14/AP	Test Set	277	10. 1. 3
TS-14A/AP	Test Set	281	10. 1. 3
TS-15/AP	Fluxmeter	111	5. 3
TS-15A/AP	Fluxmeter	113	5. 3
TS-15B/AP	Fluxmeter	115	5. 3
TS-15C/AP	Fluxmeter	119	5. 3
TS-16/APN	Test Set	149	10. 1. 2
TS-16X/APN	Test Set	153	10. 1. 2
TS-23/APN	Test Set	97	10. 1. 1
TS-24/ARR-2	Test Oscillator	457	4. 2. 2
TS-24A/ARR-2	Test Oscillator	461	4. 2. 2
TS-26A/TSM	Test Set	271	1. 3. 2. 2
TS-27B/TSM	Test Set	257	10. 4. 7
TS-33/AP	Frequency Meter	349	2. 2. 3
TS-34/AP	Oscilloscope	37	3. 1
TS-34A/AP	Oscilloscope	41	3. 1
TS-35/AP	Signal Generator	285	10. 1. 3
TS-35A/AP	Signal Generator	289	10. 1. 3
TS-36/AP	Power Meter	89	14. 3. 1
TS-39/TSM-1	Standard Oscillator	425	13. 2
TS-41/CRN-1	Test Set	391	10. 1. 5
TS-45/APM-3	Radar Test Set	293	10. 1. 3
TS-45A/APM-3	Radar Test Set	297	10. 1. 3
TS-47/APR	Test Oscillator	463	4. 2. 2
TS-60/U	Test Meter	157	1. 2. 3

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TS-61/AP	Test Set	2.2.2 207
TS-62/AP	Test Set	2.2.2 211
TS-65A/FMQ-1	Frequency Standard	13.2 427
TS-65C/FMQ-1	Frequency Standard	13.2 429
TS-67/ARN-5	Test Set	4.1.2 245
TS-67A/ARN-5	Test Set	4.1.2 249
TS-69A/AP	Frequency Meter	2.3.3 395
TS-70/AP	Radio Frequency Wattmeter	14.3.1 93
TS-74/UPM	Phantom Antenna and Attenuator	12.3.1 255
TS-87/AP	Radio Frequency Wattmeter	14.3.1 95
TS-89/AP	Voltage Divider	12.2.3 129
TS-89A/AP	Voltage Divider	12.2.3 131
TS-89B/AP	Voltage Divider	12.2.3 133
TS-90/AP	Dummy Load	12.3.1 259
TS-90A/AP	Dummy Load	12.3.1 261
TS-91/TPS-1	Test Set	2.2.2 215
TS-92/AP	Amplifier Alignment Unit	10.3 409
TS-98/AP	Voltage Divider	12.2.3 135
TS-100/AP	Test Oscilloscope	8.1 485
TS-101/AP	Test Load Unit	12.3.1 263
TS-102/AP	Range Calibrator	8.1 489
TS-102A/AP	Range Calibrator	8.1 493
TS-102B/AP	Range Calibrator	8.1 497
TS-107/TPM-1	Wave and Power Meter Set	10.1.1 101
TS-108/AP	RF Test Load	12.3.1 265
TS-110/AP	Test Set	2.2.2 219

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TS-117/GP	Wavemeter Test Set	353 2.2.3
TS-118/AP	Radio Frequency Wattmeter	97 14.3.1
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TS-120/UP	Test Set	301 10.1.3
TS-125/AP	Power Meter	105 14.3.1
TS-126/AP	Range Calibrator	501 8.1
TS-128/UP	Signal Generator	253 4.1.2
TS-129/UP	Test Antenna	89 11.1.1
TS-130/UP	Standing-Wave Meter	315 6.2.1
TS-130A/UP	Standing-Wave Meter	317 6.2.1
TS-131/AP	Pickup Assembly	105 5.2
TS-140/PCM	Test Set	367 10.1.4
TS-142/APG	Calibrator	505 8.1
TS-142A/APG	Calibrator	509 8.1
TS-147/UP	Test Set	305 10.1.3
TS-147A/UP	Test Set	309 10.1.3
TS-147D/UP	Test Set	313 10.1.3
TS-148/UP	Spectrum Analyzer	225 3.4.4
TS-154/CRW-2	Test Box	253 10.2.6
TS-155/UP	Signal Generator	371 10.1.4
TS-155A/UP	Signal Generator	375 10.1.4
TS-155B/UP	Signal Generator	379 10.1.4
TS-155C/UP	Signal Generator	383 10.1.4
TS-161/AI	Test Set	261 10.4.7
TS-162/AI	Test Set	263 10.4.7

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TS-164/AR	Frequency Meter	2.1.1 79
TS-170/ARN-5	Test Oscillator	4.1.2 255
TS-172/UP	Test Set	2.2.2 227
TS-173/UR	Frequency Meter	2.1.1 83
TS-174/U	Frequency Meter	2.1.1 87
TS-174A/U	Frequency Meter	2.1.1 91
TS-174B/U	Frequency Meter	2.1.1 95
TS-175/U	Frequency Meter	2.1.1 99
TS-175B/U	Frequency Meter	2.1.1 103
TS-175C/U	Frequency Meter	2.1.1 107
TS-178/ARM-1	Test Unit	1.3.2.3 291
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TS-184/AP	Test Set	2.2.2 231
TS-184A/AP	Test Set	2.2.2 235
TS-186C/UP	Frequency Meter	2.1.1 111
TS-186D/UP	Frequency Meter	2.1.1 115
TS-189/U	Test Set	4.2.2 467
TS-190/U	Test Set, Telephone	10.4.7 267
TS-191/UP	Test Set	10.1.3 317
TS-192/CPM-4	Wavemeter	2.2.2 239
TS-193B/CPM-4	Dummy Transmit-Receive Box	10.4.11 343
TS-195/GP	Noise Generator	4.4.1 573
TS-197/CPM-4	Signal Generator	4.1.2 257
TS-198A/CPM-4	Oscilloscope	3.2 119
TS-199/CPM-4	Test Meter	1.2.3 159

Designation	Name	Functional Classification
TS-200/CPM-4	Detector	537 11.3.2
TS-202A/U	Signal Generator	469 4.2.2
TS-203/AP	Test Indicator	151 10.2.2
TS-204/AP	Reflectometer	327 6.2.2
TS-206/AR	Radio Frequency Wattmeter	109 14.3.1
TS-208/MPM	Dummy Antenna	267 12.3.1
TS-210/MPM	Test Antenna	91 11.1.1
TS-215/AP	Phasing Analyzer	155 10.2.2
TS-218/UP	Echo Box	241 2.2.2
TS-218A/UP	Echo Box	245 2.2.2
TS-221/TSM	Standard Oscillator	393 4.2.1
TS-223/AP	Test Set	321 10.1.3
TS-226A/AP	Power Meter	111 14.3.1
TS-230C/AP	Frequency-Power Meter	105 10.1.1
TS-233/TPN-2	Test Set	157 10.1.2
TS-234/UP	Dummy Load	269 12.3.1
TS-234A/UP	Dummy Load	271 12.3.1
TS-235/UP	Dummy Antenna	273 12.3.1
TS-237/TRC-8	Test Oscillator	395 4.2.1
TS-239/UP	Oscilloscope	123 3.2
TS-247/APM-48	Wavemeter	249 2.2.2
TS-251/UP	Test Set	261 4.1.2
TS-252/AP	Test Oscillator	473 4.2.2
TS-253/AP	Dummy Load	275 12.3.1
TS-254/AP	Power Meter	115 14.3.1
TS-255/AP	Echo Box	253 2.2.2

Designation	Name	Functional Classification
TS-257/ARW	Test Set	10.2.6 255
TS-257A/ARW	Test Set	10.2.6 259
TS-259/AP	Signal Generator	10.1.3 325
TS-259A/AP	Signal Generator	10.1.3 329
TS-262A/TPS-10	Oscilloscope	3.2 127
TS-265/UP	Voltage Divider	12.2.3 137
TS-268/U	Crystal Rectifier Test Set	10.2.8 333
TS-268B/U	Crystal Rectifier Test Set	10.2.8 335
TS-268C/U	Crystal Rectifier Test Set	10.2.8 337
TS-268D/U	Crystal Rectifier Test Set	10.2.8 339
TS-268E/U	Crystal Rectifier Test Set	10.2.8 341
TS-269A/UR	Test Set	6.1.1 173
TS-269B/UR	Test Set	6.1.1 177
TS-270/UP	Echo Box	2.2.2 257
TS-270A/UP	Echo Box	2.2.2 261
TS-270B/UP	Echo Box	2.2.2 265
TS-275/UP	Echo Box	2.2.2 269
TS-278/AP	Test Set	4.2.2 477
TS-279/UPM	Dummy Load	12.3.1 277
TS-285/GP	Frequency Meter	2.2.2 273
TS-293/CPA-5	Range Calibrator	8.1 513
TS-294C/U	Voltohmmeter	1.3.1.2 209
TS-295A/UP	Frequency-Power Meter	10.1.1 107
TS-297/U	Multimeter	1.3.2.1 247
TS-305A/UP	Power Meter	14.3.1 119
TS-311A/UP	Echo Box	2.2.2 277

Designation	Name	Functional Classification
TS-311B/UP	Echo Box	281 2.2.2
TS-313/U	Test Set	73 10.1
TS-318/UP	Field Intensity Meter	23 5.1.1
TS-323/UR	Frequency Meter	119 2.1.1
TS-324/U	Oscilloscope	45 3.1
TS-326A/U	Test Oscillator	161 10.1.2
TS-326B/U	Test Oscillator	165 10.1.2
TS-328/U	Frequency Meter	455 2.6.1
TS-328A/U	Frequency Meter	457 2.6.1
TS-328B/U	Frequency Meter	459 2.6.1
TS-329/U	Dummy Antenna	279 12.3.1
TS-330/TSM	Crystal Impedance Meter	357 10.2.9
TS-333/AP	Spectrum Analyzer	229 3.4.4
TS-336/GSM-1	Magnet Charger	395 13.1
TS-338/UP	Dummy Load	281 12.3.1
TS-340/U	Voltmeter	123 1.1.5
TS-346/UP	Test Load	283 12.3.1
TS-348/AP	Signal Generator	265 4.1.2
TS-349/UP	Echo Box	283 2.2.2
TS-352/U	Multimeter	251 1.3.2.1
TS-352A/U	Multimeter	255 1.3.2.1
TS-352B/U	Multimeter	259 1.3.2.1
TS-353A/UP	Waveguide Probe	107 11.1.2
TS-354/UP	Frequency Meter Set	139 2.2.1
TS-355/UP	Test Set	77 10.1
TS-359A/U	Voltage Divider	139 12.2.3

Designation	Name	Functional Classification
TS-361A/U	Adapter	11.3.2 539
TS-363A/U	Voltmeter	1.3.1.2 213
TS-364/APX-15	Test Set	10.1 81
TS-366A/TPS-10	Dummy Load	12.3.1 285
TS-366B/TPS-10	Dummy Load	12.3.1 287
TS-375/U	Voltmeter	1.1.1 39
TS-375A/U	Voltmeter	1.1.1 43
TS-377/U	Reflectometer	6.2.2 331
TS-378/UP	Pressurizing Plate	11.5 583
TS-380/U	Multimeter	1.3.2.1 263
TS-382A/U	Audio Oscillator	4.1.1 41
TS-382B/U	Audio Oscillator	4.1.1 45
TS-382C/U	Audio Oscillator	4.1.1 49
TS-382D/U	Audio Oscillator	4.1.1 53
TS-382E/U	Audio Oscillator	4.1.1 57
TS-383A/GG	Distortion Test Set	10.4.7 269
TS-387/U	Test Set	6.1.1 181
TS-389/U	Multimeter	1.3.1.1 191
TS-397/U	Test Set	10.2.7 297
TS-402A/U	Attenuator	12.2.1 99
TS-403/U	Signal Generator	4.1.2 269
TS-403A/U	Signal Generator	4.1.2 273
TS-406/UP	Test Oscillator	4.2.2 481
TS-413/U	Signal Generator	4.1.2 277
TS-413A/U	Signal Generator	4.1.2 281
TS-413B/U	Signal Generator	4.1.2 285

Designation	Name	Functional Classification
TS-413C/U	Signal Generator	289 4. 1. 2
TS-414/U	Dynamotor Test Set	219 10. 2. 3
TS-414A/U	Dynamotor Test Set	223 10. 2. 3
TS-418/U	Signal Generator	293 4. 1. 2
TS-419/U	Signal Generator	297 4. 1. 2
TS-421A/U	Audio Oscillator	61 4. 1. 1
TS-430/U	Wattmeter	29 14. 1
TS-432/U	Noise-Field Strength Meter	27 5. 1. 1
TS-433B/U	Electronic Switch	399 10. 1. 7
TS-437(XA-A)/U	Signal Generator	301 4. 1. 2
TS-443/U	Voltmeter	109 1. 1. 3
TS-445/U	Wattmeter	31 14. 1
TS-446/U	Radio Frequency Indicator	41 5. 1. 2
TS-452/U	Signal Generator	169 10. 1. 2
TS-452A/U	Signal Generator	173 10. 1. 2
TS-452B/U	Signal Generator	177 10. 1. 2
TS-452C/U	Signal Generator	181 10. 1. 2
TS-453/U	Voltage Divider	141 12. 2. 3
TS-456/CRN-1A	Test Set	395 10. 1. 5
TS-460C/U	Impedance Bridge	219 6. 1. 4
TS-465/U	Signal Generator	305 4. 1. 2
TS-469/U	Hydrometer	285 17. 1. 1
TS-477/APN-19	Test Set	345 10. 4. 11
TS-480/U	Frequency Meter	143 2. 2. 1
TS-487/U	Voltmeter	47 1. 1. 1
TS-488/UP	Echo Box	287 2. 2. 2
TS-488A/UP	Echo Box	291 2. 2. 2

Designation	Name	Functional Classification	
TS-494/U	Frequency Meter	2.6.1	461
TS-497/URR	Signal Generator	4.1.2	309
TS-497A/URR	Signal Generator	4.1.2	311
TS-497B/URR	Signal Generator	4.1.2	315
TS-501/UP	Echo Box	2.2.2	295
TS-505/U	Electronic Multimeter	1.3.1.2	217
TS-508/UP	Test Oscillator	4.2.2	483
TS-509/UR	Field Strength Meter	5.1.2	43
TS-510/U	Signal Generator	4.1.2	319
TS-518/U	Voltmeter	1.1.2	99
TS-522/CRT-3	Test Set	10.1.11	435
TS-535/U	Signal Generator	10.1.2	185
TS-535A/U	Signal Generator	10.1.2	189
TS-537/TSM	Crystal Impedance Meter	10.2.9	361
TS-538/U	Test Set	10.1.3	333
TS-541/TPS	Test Set	10.1.3	337
TS-544/UP	Echo Box	2.2.2	299
TS-545/UP	Echo Box	2.2.2	303
TS-546/U	Crystal Test Set	10.2.9	365
TS-555/GMQ-2	Geilometer Test Set	1.3.2.3	295
TS-559A/FT	Transmission Measuring Set	10.4.7	271
TS-560( )/FT	Audio Oscillator	4.2.1	397
TS-573/UP	Range Calibrator	8.1	517
TS-577/FG	Telegraph Monitor	10.4.7	273
TS-578B/U	Decade Resistor	12.1.1	37
TS-579/U	Field Strength Meter	5.1.1	29
TS-580/U	Direct-Current Amplifier	7.1.1	381

Designation	Name	Functional Classification
TS-582/U	Impedance Bridge	235 6.1.5
TS-583A/U	Square Wave Generator	561 4.3.3
TS-584B/U	Milliammeter Recorder	183 3.3.3
TS-585B/U	Output Meter	39 14.2
TS-587A/U	Noise-Field Intensity Meter	33 5.1.1
TS-588/U	Signal Generator	323 4.1.2
TS-588A/U	Signal Generator	327 4.1.2
TS-592/UPM-15	Pulse Generator	543 4.3.2
TS-598/U	Pulse Tester	423 2.4.1
TS-598A/U	Pulse Tester	425 2.4.1
TS-602(XA)/U	Signal Generator	341 10.1.3
TS-604/U	Relay Test Set	263 10.2.6
TS-604A/U	Relay Test Set	267 10.2.6
TS-605/U	Relay Test Set	269 10.2.6
TS-606/U	Signal Generator	331 4.1.2
TS-608/U	Signal Generator	335 4.1.2
TS-611/FG	Teletypewriter Test Set	277 10.4.7
TS-615/U	Sound Analyzer	205 3.4.2
TS-617/U	Q Meter	261 6.1.9
TS-619( )/U	Vacuum-Tube Voltmeter	49 1.1.1
TS-627/U	Power Test Set	437 10.1.11
TS-629/U	Audio Level Test Panel	41 14.2
TS-629A/U	Audio Level Test Panel	43 14.2
TS-652/GG	Teletypewriter Test Set	279 10.4.7
TS-653/APG	Synchro Phasing Tester	157 10.2.2
TS-653A/APG	Synchro Phasing Tester	161 10.2.2
TS-656(XC)/U	Meter Tester	397 13.1

Designation	Name	Functional Classification
TS-657/FG	Teletypewriter Test Set	10.4.7 281
TS-658/UG	Teletypewriter Test Set	10.4.7 283
TS-659/UG	Teletypewriter Test Set	10.4.7 285
TS-660/UG	Teletypewriter Test Set	10.4.7 287
TS-666/AP	Computer Calibrator	10.3 411
TS-666A/AP	Computer Calibrator	10.3 413
TS-667/AP	Computer Test Set	10.3 415
TS-667A/AP	Computer Test Set	10.3 417
TS-671/U	Decade Capacitor	12.1.3 61
TS-673A/U	Signal Tracer	10.1.12 439
TS-676/U	Transmission Line Fault Locator	10.4.7 289
TS-677(XW)/UP	Moving Target Indicator Evaluator Set	10.1.10 429
TS-678(XW-3)/U	Spectrum Analyzer	3.4.4 233
TS-680(XA)/U	Spectrum Analyzer	3.4.4 235
TS-682/GSM-1	Meter Test Set	13.1 399
TS-683/TSM	Crystal Impedance Meter	10.2.9 367
TS-689/U	Meter Test Set	13.1 403
TS-690/U	Meter Test Set	13.1 407
TS-691/U	Meter Test Set	13.1 411
TS-697/U	Stalo Stability Tester	10.1.10 433
TS-710(XS)/TSM	Crystal Impedance Meter	10.2.9 371
TS-712/TCC-11	Test Set, Telephone	10.3.2 563
TS-713/U	Synchro Test Set	10.2.2 163
TS-714/U	Synchro Alignment Set	10.2.2 165
TS-723/U	Spectrum Analyzer	3.4.5 257
TS-724/SAC	Infrared Test Set	10.1.13 443
TS-742/UPM	Spectrum Analyzer	3.4.4 239

Designation	Name	Functional Classification
TS-743/UPM	Radar Test Set	345 10.1.3
TS-750/URM	Stethoscope	441 10.1.12
TS-788/A	Magnetic Compass Alignment Set	23 10.2
TS-810/U	Crystal Calibrator	447 13.8
TS-816/U	Test Set, Telephone	165 10.4.3
TS-842/G	Capacitance Decade	63 12.1.3
TS-858/UP	Spectrum Analyzer	243 3.4.4
TS-897/U	Test Set, Electrical Power	227 10.2.3
TS-999/U	DRT Test Set	385 4.1.3
TS-1100/U	Transistor Tester	343 10.2.8
TV-2/U	Test Set, Electron Tube	301 10.2.7
TV-3A/U	Tube Tester	305 10.2.7
TV-3B/U	Tube Tester	309 10.2.7
TV-4A/U	Tube Tester	313 10.2.7
TV-6(XE)/U	Electron Tube Test Set	315 10.2.7
TV-7/U	Test Set, Electron Tube	319 10.2.7
U-18/UP	Adapter	559 11.3.3
U-51/U	Adapter	541 11.3.2
UG-27C/U	Radio Frequency Adapter	119 11.2.1
UG-28A/U	Radio Frequency Adapter	337 12.3.5
UG-29B/U	Radio Frequency Adapter	121 11.2.1
UG-30C/U	Radio Frequency Jack	123 11.2.1
UG-38A/U	Radio Frequency Receptacle	125 11.2.1
UG-51/U	Cover	345 11.2.7
UG-57B/U	Radio Frequency Adapter	127 11.2.1
UG-59B/U	Radio Frequency Plug	129 11.2.1
UG-83A/U	Adapter	165 11.2.3

Designation	Name	Functional Classification	
UG-88C/U	Radio Frequency Plug	11.2.1	131
UG-89B/U	Radio Frequency Jack	11.2.1	133
UG-107B/U	Radio Frequency Adapter	12.3.5	339
UG-119/UP	Crystal Adapter	11.2.4	213
UG-146/U	Adapter	11.2.3	167
UG-179/AP	Adapter	11.2.1	135
UG-180A/U	Plug	11.2.1	137
UG-181A/U	Receptacle	11.2.1	139
UG-196/U	Adapter	12.3.5	341
UG-197/U	Adapter	11.2.3	169
UG-201A/U	Adapter	11.2.3	171
UG-213A/U	Adapter	11.2.3	173
UG-224/U	Adapter	11.2.1	141
UG-255/U	Adapter	11.2.3	175
UG-270/U	Adapter	11.2.3	177
UG-271/U	Adapter	11.2.3	179
UG-273/U	Adapter	11.2.3	181
UG-274A/U	Adapter	12.3.5	343
UG-283/U	Elbow	11.2.2	159
UG-284/U	Elbow	11.2.2	161
UG-306/U	Adapter	11.2.1	143
UG-309/U	Adapter	11.2.3	183
UG-326/TPM-7	Adapter	11.2.1	145
UG-349A/U	Adapter	11.2.3	185
UG-397/U	Adapter Connector	11.2.4	215
UG-398/U	Adapter Connector	11.2.4	217
UG-399/U	Adapter Connector	11.2.4	219

Designation	Name	Functional Classification
UG-400/U	Adapter Connector	221 11.2.4
UG-402/U	Adapter Connector	223 11.2.4
UG-420/U	Waveguide Flange	347 11.2.7
UG-446/U	Adapter Connector	225 11.2.4
UG-519/U	Adapter Connector	187 11.2.3
UG-552/U	Adapter Connector	227 11.2.4
UG-607/U	Adapter Connector	189 11.2.3
UG-608/U	Adapter Connector	201 11.2.3
UG-609/U	Adapter Connector	203 11.2.3
UG-610/U	Adapter Connector	205 11.2.3
UG-611/U	Adapter Connector	207 11.2.3
UG-683/U	Crystal Socket Adapter	543 11.3.2
UG-953/U	Coaxial To Waveguide Adapter	229 11.2.4
UG-978/U	Connector, Adapter	147 11.2.1
UG-1065/U	Connector, Receptacle	149 11.2.1
UG-1066/U	Connector, Receptacle	151 11.2.1
ZM-3/U	Analyzer	223 6.1.4
ZM-4/U	Resistance Bridge	185 6.1.1
ZM-4B/U	Resistance Bridge	187 6.1.1
ZM-6/U	Impedance Bridge	227 6.1.4
ZM-9/U	Resistance Bridge	189 6.1.1
ZM-11/U	Capacitance-Inductance-Resistance Bridge	229 6.1.4
ZM-17/U	Ohmmeter	193 6.1.1
ZM-21A/U	Ohmmeter	195 6.1.1
ZM-22/U	Q Meter	265 6.1.9

Designation	Name	Functional Classification
ZM-23/U	Megohmmeter	6.1.1 197
14ABA-1	Echo Box	2.2.2 307
14ACN	Dummy Load	12.3.1 289
60089	Vacuum Tube Megohmmeter	6.1.1 199
60094	RF Bridge	6.1.5 239

Manufacturer and Model	Name	Functional Classification
AC Spark Plug Co.		
MTL-41401	K-System Cable Tester	201 6.1.1
RTL-5351	Tester, Preflight	309 10.4.10
AD-YU Company		
205A1	Phase Detector	251 6.1.8
Airborne Instruments Lab.		
390A-3	Test Set, Crystal Checker	347 10.2.8
Aircraft Radio Corp., The		
16100	Bench Test Kit	35 10.4
Airesearch Manufacturing		
UED6-1-1	Dynamometer-Motor Test	163 14.4.2
UMTD1-1-1	Dynamometer	165 14.4.2
American Time Products		
2001-2	Frequency Standard	431 13.2
2005	Frequency Standard	433 13.2
Ballantine Labs., Inc.		
220B	Decade Amplifier	375 7.1
300	Voltmeter	51 1.1.1
320	Voltmeter	55 1.1.1
402A	Multiplier	117 12.2.2
402B	Multiplier	119 12.2.2
Berkeley Div. of Beckman Instruments		
554	Events-Per-Unit-Time (EPUT) Meter	401 2.4
903	Double Pulse Generator	505 4.3.1
7250	Time-Interval Meter	533 8.3
Biddle, James G. Co.		
7679-RK	Megger Insulation Tester	205 6.1.1
9679-RK	Megger Insulation Tester	207 6.1.1
Bird Electronic Corp.		
43	Wattmeter, Thruline Directional, 50 Watts, 100-250 mcs	121 14.3.1

Manufacturer and Model	Name	Functional Classification
Bird Electronic Corp. (Continued)		
61	Wattmeter, RF	14.3.1 125
62S5	RF Wattmeter	14.3.1 127
67	Termaline Wattmeter	14.3.1 129
67C	Wattmeter	14.3.1 131
80-F	Termaline Coaxial Load Resistor	12.3.1 291
82	Termaline Coaxial Load Resistor	12.3.1 293
611	RF Wattmeter	14.3.1 133
613	Wattmeter, Termaline	14.3.1 135
840A	Pulse Converter	11.2.4 231
6250	Wattmeter, RF	14.3.1 137
Boonton Radio Corp.		
91C	Voltmeter	1.1.1 59
170-A	Q Meter	6.1.9 267
202B	Signal Generator	4.1.2 339
202D	Signal Generator	4.1.2 343
203-B	Univerter	7.3 409
207-A	Frequency Converter Accessory	4.1.3 389
Brown Instruments Div. (M.H.)		
153X12V	Recorder, Strip Chart	3.3.3 185
Browning Laboratories, Inc.		
RH-10	Calibrator Set, WWV	2.5.2 451
Brush Electronics Co.		
BL-202	Magnetic Oscillograph	3.3.3 189
BL-320	Universal Amplifier	7.1.1 383
BL-928	Dual-Channel DC Amplifier	7.1.1 387
BL-932	Amplifier, DC	7.1.1 389
RD 2521-00	Recorder	3.3.3 193
Cal-Tronics Corporation		
10949	Test Set, Roll Servo	10.4.1 61
10983	Test Set, Terminal Box	10.2 25
210739	Test Set, Antenna Hand Control	10.2.2 169
210740	Test Set, Indicator, Power Supply	10.3.1 551
210743	Test Set, Roll and Pitch Control	10.2.1 105

Manufacturer and Model	Name	Functional Classification
Computer Co. of America, Div.		
PVM-4B	Voltmeter, Precision	61 1.1.1
Cornell-Dubilier Electric Corp.		
CDA-5	Decade Capacitor	65 12.1.3
CDB-3	Decade Capacitor	67 12.1.3
CDC-3	Decade Capacitor	69 12.1.3
Daven Co., The		
H-693	Attenuator Network	101 12.2.1
RFB-540-73, 541-73, 542-73	Step Attenuator	103 12.2.1
187	Decade Voltage Divider	143 12.2.3
6800	Attenuator Network Matching Pads	105 12.2.1
Dayton Electric Mfg. Co.		
IC-939	Blower	607 11.5.2
DIT-MCO, Inc.		
200	Circuit Analyzer	27 10.2
DuMont, Allen B, Labs., Inc.		
303-AH	Synchroscope	131 3.2
304-A	Oscilloscope	49 3.1
DYMEC Div. of Hewlett-Packard		
DY-623B	Signal Generator	349 10.1.3
Dyna-Labs, Incorporated		
D-79	Gaussmeter	121 5.3
Eastman Kodak Co.		
E 33501	Fixture, Collimator Assembly	359 19.1
E 33502	Fixture, Drive Unit	361 19.1
E 33504	Fixture, Alignment	345 19.
Eclipse-Pioneer Div.		
13021-1-B	Driftmeter Collimator	363 19.1
13251-1-A	Transformer, Zero-Setting	171 10.2.2

Manufacturer and Model	Name	Functional Classification
Eclipse-Pioneer Div. (Continued)		
13618-3-A	Control, Servo Test	10.4.1 65
13632-1A-A	Test Indicator, Magnesyn	10.2.2 173
13643-1-A	Tester, Autosyn	10.2.2 177
13644-1-A	Tester	10.2.2 179
13647-1-A	Indicator	10.2.2 181
13656-1-A	Bandpass Filter	12.2.4 155
13669-2-A	Field Tester, Synchro Instrument	10.2.2 183
13673-1-A	Power Supply, Two-Phase	11.6 641
13681-1-A	Test Control, Servo	10.4.1 69
13700-1-A	Tester, Insulation	10.4.5 201
13716-1-A	Tester	14.4.2 167
13739-1-A	Control	11.6 645
13751-1-A	Dynamometer	14.4.2 169
13751-2-A	Dynamometer	14.4.2 171
13751-3-A	Dynamometer	14.4.2 173
13751-4-A	Dynamometer	14.4.2 175
13824-1-A	Test Set, Power Supply	10.3.1 553
13850-1-A	Test Set, Proportional Voltage	10.2.2 187
Electrical Facilities, Inc.		
K-3	Phase Sequence Indicator	6.1.8 255
Electro-Measurements, Inc.		
250DA	Impedance Bridge	6.1.5 243
Electro-Pulse, Inc.		
2120A	Pulse Generator	4.3.2 545
Electronic Tube, Corp.		
H-43	Four-Channel Oscilloscope	3.1 53
El Tronics, Inc.		
CA-2523	Video Pulse Counter	2.4.1 427
Emerson Electric Mfg. Co.		
F.S. 120	Ammeter	1.2.3 161
Empire Devices Prod., Corp.		
NF-105	Noise and Field Intensity Meter	5.1.3 79
NF-112	Field Intensity Meter	5.1.3 83

Manufacturer and Model	Name	Functional Classification
Ferris Instrument Co.		
16C	Standard Signal Generator	345 4. 1. 2
Fluke, John Mfg. Co., Inc.		
803	Voltmeter	65 1. 1. 1
8011A	DC Voltmeter	69 1. 1. 1
Ford Instrument Co.		
NSA-1	Tester, Amplifier	177 14.4.2
NSA-2	Tester, Power Supply	555 10. 3. 1
NSA-3	Tester, Time Amplifier	179 14.4.2
NSA-4	Tester, Alignment	31 10.2
Frahm (James G. Biddle Co.)		
MF 9	Frequency Meter	463 2.6.1
Friez Instrument Div.		
CA-2520	Frequency Measuring Unit and Pulse Power Detector	109 10. 1. 1
General Electric Co.		
D-7604681	Calorimeter	139 14. 3. 1
ST-4A	Sweep Generator	493 4. 3
141D283G1	Fixture, Band Setting	111 10. 2. 1
141D617G1	Panel Gyro Test Bench	109 10. 2. 1
141D618G1	Panel, Turntable Control	111 10. 2. 1
142D557G1	Stand Assembly, Collimating	305 10. 4. 8
144D429G1	Tester, Amplifier Gain and Balance	419 10. 3
211A855P-1	Bellows Leveler	33 10. 2
519E645G1	Turntable, Ten Speed	111 10. 2. 1
7603348G1	Test Set	649 11. 6
7705055G1	Servo Test Meter	111 1. 1. 3
7707034G1	Torque Indicator	181 14. 4. 2
9076040G2	Dummy Director	421 10. 3
9161931G1	Lead Checker	115 10. 2. 1
9628924G1	Electrical Computer Tester	111 10. 4. 2
9742799G-2	Dynamometer	183 14. 4. 2
9797134G1	Computer Tester	113 10. 4. 2

Manufacturer and Model	Name	Functional Classification
General Mills, Inc.		
TSY-7001	Head End Focal Length Scope	19 349
TSY-7018	Optical Bench	19 351
TSY-7028	Fixture, Desiccator Pump Test	10.2 35
TSY-7030	Gage and Adapter, Pressure Test	10.4.10 311
TSY-7060	Fixture, Light Transmission Check	19 353
TSY-7071	Fixture, Backlash Checking	10.3 423
TSY-7107	Tester, Coordinate Converter	10.3 425
TSY-7111	Fixture, Y-4 Troubleshooting	10.4.1 73
TSY-7112	Tester, Servo Amplifier	10.3 427
TSY-7133	Gear Box, Master	13.17 589
General Radio Company		
DNT-3	Detector	7.3 413
MD-1	Fuel Quantity Gage Tester	13.16 579
M2	Variac, Autotransformer	12.1.4 79
P-582	Capacitance Bridge	13.16 583
V-10G3	Variable Autotransformer	12.1.4 81
V-10MT	Variable Autotransformer	12.1.4 83
V-20M	Variable Autotransformer	12.1.4 85
W5M	Variac, Autotransformer	12.1.4 87
219M	Decade Condenser	12.1.3 71
546-C	Microvolter, Audio-Frequency	12.2.1 107
631B	Strobotac	2.6.2 465
720-A	Frequency Meter	2.1 29
723	Vacuum Tube Fork Test Kit	4.2.1 399
724-B	Frequency Meter	2.2.1 147
740B	Capacitance Test Bridge	6.1.3 215
805-C	Standard Signal Generato:	4.1.2 349
830-E	Filter, Low Pass	12.2.4 157
874-GA	Attenuator, Coaxial	12.3.2 315
874-G10	Attenuator, Coaxial	12.3.2 319
874-QBJA	Adaptor, Coaxial	11.2.1 153
874-QBPA	Adaptor, Coaxial	11.2.1 155
874-QNPA	Adaptor, Coaxial	11.2.1 157
874-WM	Termination, Coaxial	12.3.1 295
1000-P6	Crystal Diode Modulator	12.4 375
1301-A	Oscillator, Low Distortion	4.2.1 401
1390-B	Random Noise Generator	4.4.1 575
1432-M	Decade Resistor	12.1.1 39

Manufacturer and Model	Name	Functional Classification
General Radio Company (Continued)		
1432-N	Decade Resistor	39 12.1.1
1432-P	Decade Resistor	47 12.1.1
1450TA	Decade Attenuator	111 12.2.1
1454-A	Decade Voltage Divider	145 12.2.3
1490-D	Decade Inductor	57 12.1.2
1553-A	Vibration Meter	319 18.1.1
1602-B	Admittance Meter	245 6.1.6
1661-A	Bridge, Vacuum Tube	323 10.2.7
1800A	Vacuum Tube Voltmeter	73 1.1.1
1932A	Distortion and Noise Meter	261 3.4.5
Gertsch Products, Inc.		
RT-5	AC Voltage Divider	147 12.2.3
RT-9	AC Voltage Divider	149 12.2.3
ST-100	Bridge Transformer	89 12.1.4
Heiland Div. of Minneapolis-Honeywell		
ST-2	Synchrotester	377 19.2
Helipot Corp., The		
T-10	Linear Variable Resistance	151 12.2.3
T-10A	Linear Variable Resistance	153 12.2.3
Hewlett-Packard Company		
200CD	Wide Range Oscillator	403 4.2.1
200D	Audio Oscillator	65 4.1.1
202-A	Oscillator, Audio	509 4.3.1
300A	Wave Analyzer	199 3.4.1
330C	Distortion Meter	265 3.4.5
350A	Attenuator Set	113 12.2.1
360-A	Filter, Low Pass	327 12.3.3
400AB	Vacuum Tube Voltmeter	77 1.1.1
400C	Vacuum Tube Voltmeter	79 1.1.1
410B	Vacuum Tube Voltmeter	221 1.3.1.2
412A	Vacuum Tube Voltmeter	193 1.3.1.1
420A	Crystal Detector	47 11
431A	Power Meter	143 14.3.1
440A	Detector Mount	109 11.1.2
459A	High Voltage Probe	111 11.1.2

Manufacturer and Model	Name	Functional Classification	
Hewlett-Packard Company (Continued)			
490B	Traveling Wave Tube Amplifier	7.1.5	397
491A	Traveling Wave Tube Amplifier	7.1.5	401
521G	Electronic Counter	2.4	405
522B	Electronic Counter	2.4	409
523DR	Electronic Counter	2.4	413
540B	Transfer Oscillator	7.3	417
608A	VHF Signal Generator	4.1.2	353
608B	Signal Generator	4.1.2	357
608D	Signal Generator	4.1.2	361
624A	Signal Generator	10.1.3	353
650A	Test Oscillator	4.1.2	365
686A	Sweep Oscillator	4.2.2	485
715A	Power Supply	11.6	651
Hickok Electrical Instrument Co.			
110B	Vacuum Tube Voltmeter	1.1.1	81
539B	Tube Tester	10.2.7	327
547A	Tube Tester	10.2.7	329
Hughes Aircraft Company			
404000-110	Test Bench, Maintenance (Complete)	10.3.4	603
404000-111	Test Bench, Maintenance	10.3.4	607
404000-112	Test Bench, Maintenance (Complete)	10.3.4	611
404014-100	Oven-Thermal Drying Electrical Dehydrator	11.5	585
413011-100	Test Set, Computer Air Data	10.2	37
486005-110	Tester, Pressure Transducer	10.4.2	117
486094-100	Test Set, Computer Service and Alignment, Type MA-1	10.4.2	121
486095-100	Assembly, Cable, Type MA-1, with Carrying Case	10.4.2	121
486196-110	Test Set, Radar Tracking Loop	10.4.1	77
486396-100	Test Set, Radar, Pressurization	10.4.11	347
Hycon Manufacturing Co.			
CA-2521	Cathode-Ray Oscilloscope	3.2	135
Ideal Industries, Inc.			
36/41-001B	Tester, Insulation Breakdown	6.3	349

Manufacturer and Model	Name	Functional Classification
Industrial Instruments, Inc.		
P-2	Voltage Breakdown Tester	35 6.3
Jones, M. C., Electronics Company		
MM706	Reflectometer	335 6.2.2
MM707	Reflectometer	337 6.2.2
Kay Electric Company		
20	Step Attenuator	115 12.2.1
CP 932-B	Generator, Sweep	407 4.2.1
Marka-Sweep Model Video	Generator, Sweep Video	497 4.3
Mega-Node	Generator, Noise	579 4.4.1
Rada Sweep 380A	Generator, Sweep Signal	33 4
Kollsman Instrument Corp.		
TE5694	Indicator, Mach Number, Repeater	431 10.3
TE5696	Indicator, True Airspeed, Repeater	433 10.3
TE5709	Indicator, Servo	189 10.2.2
TE5710	Amplifier, Servo	379 7.1
TE5711	Switch, Synchro Null Check	191 10.2.2
TE5712	Switch, Electrical Zero Check	435 10.3
TE-5713, TE5714	Switch, Selector	437 10.3
TE5717	Switch, Resistance Selector	127 10.4.2
TE5727	Tester, Amplifier	439 10.3
TE5728	Tester, Power Supply	557 10.3.1
Lab for Electronics, Inc.		
401	Synchroscope	139 3.2
Lambda Electronics Corp.		
25	Power Supply	655 11.6
Lavoie Laboratories		
LA-239C	Oscilloscope	143 3.2
LA-302	Robotester	41 10.2
Lear, Incorporated		
LT-3213	Test Panel, Rate Gyro	117 10.2.1

Manufacturer and Model	Name	Functional Classification	
Leeds and Northrup Company			
CF-19	Equalizing Block	11.5	587
P-7552	Precision Potentiometer	1.5	303
1091	Decade Capacitor, Mica	12.1.3	73
2420	Portable Galvanometer	1.4	299
4725	DC Wheatstone Bridge	6.1.1	211
4747	AC Resistor, Adjustable	12.1.1	51
4749	AC Resistor, Adjustable	12.1.1	53
7308	Cell, Standard	13.1	415
8160	Platinum Resistance Thermometer	15.1	211
8163	Platinum Resistance Thermometer	15.1	213
8658	Pyrometer	15.2	225
9003	Checking Furnace	13.14	571
Lewis Engineering Company			
81T26A	Electrical Thermometer Tester	13.14	573
Liberty Motors and Engineering Co.			
122	Tester, Fuel Flowmeter	17.4	297
Lockheed Aircraft Corp.			
453352-6	Target Harmonization and Boresight	10.4.9	307
456682	Target Stand, Universal Boresight	11.5.1	595
458535	Tester, Intervalometer Circuit	10.4.5	203
Maxson, W.L. Corp., The			
E66228	Test Unit Assembly, Timer	10.4.2	131
E66229	Test Unit Assembly	10.4.2	135
P-1060	Low Frequency Phase Meter	6.1.8	257
901	Precision Phasemeter	13.10	555
M.B. Manufacturing Co., Inc.			
M3	Vibration Meter	18.1.1	323
PC1	Vibration Pickup Calibrator	13.11	561
Measurements, Corp.			
59	Megacycle Meter	10.1.2	193
79B	Pulse Generator	4.3.2	549
82	Standard Signal Generator	4.2.1	411
84-TVR	Standard Signal Generator	4.1.2	369

Manufacturer and Model	Name	Functional Classification
Meriam Instrument Company		
A-203	Mercury "30" Manometer	17.3 289
30PA10	Manometer	17.3 291
Micro Balancing, Inc.		
EU-2	Dynamic Balancer	10.2 45
Microwave Equipment Co., Inc.		
611	Attenuator, Variable Waveguide	12.3.2 321
Mine Safety Appliances Company		
R-1	Indicator, Combustible Gas	17 263
3	Explosimeter	17 265
Minneapolis-Honeywell Regulator Co.		
HT108	Tester, Fuel Gage Tank Unit	6.1.3 217
HT117	Pulse Generator, Servo Test	4.3.2 551
HT142	Servo Torque Tester	14.4.2 185
HT159	Table, Vertical Gyro Leveling	11.5.1 599
HT163-A	Tester, Rate Gyro Calibrating	10.2.1 119
HT170	Wobble Table	10.2.1 121
HT171	Turntable, Rate Gyro	10.2.1 125
HT172	Generator, Pulse, Servo Run-In	4.3.2 553
HT174	Tester, Vertical Gyro Precession	10.2.1 127
HT253	Drill Jig, Vertical Gyro Rotor	10.2.1 129
HT273, HT274	Rotor Mounting Chuck	11.5.1 599
HT275	Drill Jig, Rate Gyro Rotor	10.2.1 131
UG25A-1	Tester, Gyro Electrical	10.2.1 133
UG47A-1	Tester-Amplifier Electrical Compass Coupler	10.3 441
UG48A-1	Tester-Amplifier Electrical	10.3 443
UG52A-1, UG52B-1	Rotor Balancing Chuck	11.5.1 601
UG58A-1	Calibrator, Bellows Travel	10.2 49
UG59A-1	Controller, Variable Air Pressure	10.2 51
UG61A-1	Tester, Sense Unit, Calibration	10.3 445
UG63A-1	Tester-Flight Controller, Electrical	10.2 53
UG66A-1	Tester-Electrical Signal Motor	10.2.3 231
UG89A-1	Tester, Followup Motor, Electrical	10.2.3 233
UG98A-1	Tester, Mockup, Altitude Control	10.3.4 615

Manufacturer and Model	Name	Functional Classification	
Minneapolis-Honeywell Regulator Company (Continued)			
UG99A-1	Tester, Amplifier, Electrical	10.3	447
UG115A-1	Tester, Bellows, Area Compensation	10.2	55
UG117A-1	Tester, Altitude Control	10.2	57
UG126A-1	Tester-Motor, Electrical	10.2.3	235
UG136A-1	Tester-Flight Controller Torque and Displacement	10.2	59
UG145A-1	Tester	10.4	39
UG147A-1	Fixture, Run-In Signal Control Motor	10.2.3	237
UG149A-1	Tester, Pedal Force Transducer, Electrical	10.2	61
UG150A-1	Calibrator-Altitude Compensator	10.3	449
UG152A-1	Tester, Altitude Compensator, Electrical	10.2	65
UG153A-1	Tester, Field, Autopilot System	10.4	41
UG154A-1	Bench, Flyaway, MH-11C1 Autopilot	10.3.4	617
UG182A-1	Tester-Adapter, Altitude Trim Electrical	10.3	451
UG183A-1	Pulse Rate Indicating Tester	8	439
UG189A-1	Tester, Airspeed Compensator Electrical	10.3	453
UG190A-1	Fixture, Run-In, Control Motor	10.2.3	239
UG198A-1	Bench, Flyaway, MH-11C2 Autopilot	10.3.4	615
UG201A-1	Tester, Integrator, Electrical	10.3	455
UG204A-1	Tester-Field Preflight Electrical LABS	10.4.2	137
UG205A-1	Tester, Mockup, Electrical LABS	10.4.2	139
UG213A-1	Tester, Sector Switch	10.2	67
Y 156X63P24-X-(L)	Pyrometer	15.2	227
Missouri Research Labs., Inc.			
312D	Range Calibrator	8.1	519
North American Aviation, Inc.			
11118-307	Comparator, Voltage and Phase	10.4	45
15412-305	Test Set, Computer Plug-In System	10.3	457
North Atlantic Industries, Inc.			
VM-204-s151	Phase Angle Voltmeter	6.1.8	259

Manufacturer and Model	Name	Functional Classification
Northrop Aircraft, Inc.		
N-1703-500	Assembly, Rocket Test Stand	10.4.4 189
Philco Corporation		
463-2338-1, -2, -3	Test Set, Microwave, RF	10.1.3 359
5005	Mobiliner	4.1.2 373
Polarad Electronics Corp.		
FIM	Field Intensity Meter	5.1.3 87
LSA	Spectrum Analyzer	3.4.4 247
MSG-1	Signal Generator	4.1.2 375
P-3	Transistor Microwave Power Meter	14.3.1 147
TSA	Spectrum Analyzer	3.4.4 253
Polytechnic Research & Dev. Co.		
130-B	Attenuator	12.3.2 323
250-A	RF Probe	11.1.2 113
650B	Power Bridge	14.3.1 151
902	Signal Generator	4.1.2 379
Potter Aeronautical Company		
6A	Electronic Flowmeter Tachometer	17.4 301
Presto Recording Corp.		
100	Microwave Secondary Frequency Standard	13.4 443
Radio Corporation of America		
158	Oscilloscope	3.1 57
195-A	Voltohmyst	1.3.1 179
Radio Frequency Labs, Inc.		
1203	Insulation Tester	6.3 355
Rawson Electrical Instrument Co.		
518	AC, DC Voltmeter	1.1.5 125
Sensitive Research Instrument Corp.		
A	Thermocouple Milliammeter	1.2.5 173
ESD	Electrostatic Voltmeter	1.1.5 127

Manufacturer and Model	Name	Functional Classification	
Sensitive Research Instrument Corp. (Continued)			
S	DC Voltmeter	1.1.3	113
Servomechanisms, Inc.			
RST 104	Test Set	10.4.1	79
Shallcross Mfg. Co.			
671	Milliohmmeter	6.1.1	213
Sickles, F.W., Div.			
III	Range Calibrator	8.1	521
Sierra Electronic Corp.			
137A	Coupler, Directional Wideband	12.3.5	345
138A	Coupler, Directional Wideband	12.3.5	347
148	Detector, Crystal	11	49
150A	Coupler, Directional Wideband	12.3.5	349
160-20M-50	Termination, Coaxial	12.3.1	297
Sikorsky			
S1670-10070	Line Maintenance Tester	10.4.5	205
Simpson Electric Company			
303	Vacuum Tube Voltohmmeter	1.3.1.2	223
373	DC Milliammeter	1.2.3	163
377	DC Voltmeter	1.1.3	115
Spencer-Kennedy Labs, Inc.			
202D	Amplifier, Wideband	7.1.5	403
Sperry Gyroscope Company			
T-100060	Scorsby Base	10.2.1	135
T-100719	Table, Tilt-Turn	10.2.1	137
T-100767	Cable Tester	10.4.3	167
T-100803	Analyzer, Vertical Gyro and Compass Control	10.2.1	139
T-100812	Amplifier Analyzer	10.3	461
T-100844	Servo System Analyzer	10.4.1	83
T-100881	System Analyzer	10.4.10	313

Manufacturer and Model	Name	Functional Classification
Sperry Gyroscope Company (Continued)		
T-100884	Computer Analyzer	10.4.10 315
T-100895	Amplifier Analyzer	10.3 465
T-100909	Analyzer-Turn Generator	10.2.2 193
T-100925	Table, Scorsby	10.2.1 143
T-101000	Collimator	19.1 367
T-101001	Stabilization Tester Assembly	10.3 467
T-101002	Tester, Amplifier	10.3 469
T-101003	Synchro Signal Tester	10.2.2 195
T-101005	Range Calibrator	13.4 445
T-101007	Oscilloscope Tachometer	2.6.3 467
T-101008	Control Assembly-Tracking Computer	10.4.2 143
T-101009	Component Resolver Tester Assembly	10.4.2 145
T-101013	Gyro Turntable	10.2.1 145
T-101018	Meter Unit Tester Assembly	10.3 473
T-101020	Synchro Zeroing Tester Assembly	10.2.2 199
T-101021	Transmitter, Assembly, Data	10.2.2 201
T-101023	Data Repeater Indicator	10.3 475
T-101024	Transmitter, Dummy T.A.S. and ALT.	10.4.2 147
T-101025	Tester Assembly, Navigational Control	10.3 479
T-101027	Compass Swinging Tester	10.2.2 203
T-101029	Transform[illegible], General Purpose	12.1.4 91
T-101031	Master Synchro Tester Assembly	10.2.2 207
T-101043	Servo Motor Control Assembly	10.4.1 87
T-101046	Analyzer, Navigational Control	10.2.2 209
T-101052	Bombing Computer Analyzer	10.4.2 149
T-101055	Analyzer-Polar Converter	10.2 69
T-101058	Stabilization Unit Analyzer	10.3 481
T-101061	Azimuth Computer Tester	10.4.2 151
T-101065	Tester, Clutch Torque	10.2 71
T-101067	Panel, Control	11.6 657
T-101070	Gyro Power Consumption Checker	14.2 45
T-101071	Fixture, V.S.D. Test	10.2 73
T-101073	Analyzer, Sine Wave Generator	2.1 31
T-101075	Analyzer, Pedestal Generator, I.C.E.	10.2 75
T-101076	Analyzer, Phase Shift	10.2 79

Manufacturer and Model	Name	Functional Classification	
Sperry Gyroscope Company (Continued)			
T-101077	Analyzer, Range Servo Amplifier, I.C.E.	10.3	483
T-101078	Analyzer, I.C.E. Range Azimuth Indicator	10.2	81
T-101079	Azimuth Generator Analyzer	10.3	485
T-101081	PPI Offset Analyzer	10.3	487
T-101086	AC Servo Control Panel	10.4.1	89
T-101097	Control Panel, DC Servo	10.2.3	241
T-101098	Fixture, Test Integrator, Variable Speed Drive	18.2	327
T-101100	Panel, System Test	10.3.4	621
T-101101	Dummy Radar Fixture	10.4.2	153
T-101103	Rack, Junction Box	10.3.4	623
T-101105	Fixture, Dummy Autopilot and Heading Transmitter	10.3	489
T-101126	Junction Box, Power Supply	11.6	659
T-101144	Analyzer, High Voltage Supply	10.3.1	559
T-101145	Analyzer-Power Supply	10.3.1	561
T-101153	Stabilization Data Repeater	10.4.2	155
T-101234	Magnetic Variation Cam Static Test Fixture	10.2.2	213
T-101235	Fixture, Variable Speed Drive Navigation Unit	18.2	329
T-101251	Computer Simulator	10.4.11	349
T-101270	Fixture, Amplifier Aging and Testing	10.3	491
T-101271	Fixture, Amplifier Aging and Testing	10.3	495
T-101272	Fixture, Amplifier Aging and Testing	10.3	499
T-101273	Fixture, Amplifier Aging and Testing	10.3	503
T-101274	Fixture, Amplifier Aging and Testing	10.3	507
T-101275	Fixture, Amplifier Aging and Testing	10.3	511
T-101276	Fixture, Amplifier Aging and Testing	10.3	515
T-101278	SA, CA, and Turn Generator Fixture	10.2	85
T-101286	Tester, Multiplier Assembly	10.3	519
T-101287	Fixture, Test, Amplifier Torque Motor	14.4.2	187
T-101439	Stand, Roll Stabilization	10.3	523
209	Directional Coupler	12.3.5	351

Manufacturer and Model	Name	Functional Classification
Sperry Gyroscope Company (Continued)		
237	Directional Coupler	12.3.5 353
242	Dummy Load	12.3.1 299
306	Directional Coupler	12.3.5 355
320	Meter, Impedance	6.2.1 321
322	Directional Coupler	12.3.5 357
467-20	Coupler, Directional Coaxial	12.3.5 359
539	Detector, Standing Wave	10.1.8 405
821	Barretter	14.3.3 159
1,000,005	Turntable-Computer Portable	10.4.2 159
1,000,013	Optical Target Tester	19.1 371
1,000,014	Turntable-Computer	10.4.2 163
1,000,034	Analyzer-Amplifier	10.3 527
1,000,036	Analyzer, Computer	10.3 531
1,000,041	Analyzer System	10.4.10 317
1,000,042	Analyzer, Sight Head	10.3 535
1,000,049	Analyzer, Turn Controller	10.3 539
1,000,117	Voltage Comparator	10.2.2 217
1,000,131	Analyzer, Accelerometer	4.2.2 489
1,000,132	Safety Monitor Amplifier Analyzer	10.2 89
1,000,178	Checker, Continuity, Polar NAV Control	6.1 147
1,000,179	Polar Navigation Control Analyzer	10.2 91
1,000,181	AC Servo Motor Test Stand and Adapter	10.2 93
1,000,273	Control, Radar Set	10.4.11 351
1,000,300	Analyzer, Flight Controller	10.3 541
1,000,307	Analyzer, Altitude Control Assembly	10.3 543
1,000,308	Voltmeter	1.3.1.3 225
1,000,309	Analyzer, Autopilot Amplifier	10.2 95
1,000,323	Analyzer, Turn Generator	10.2 97
1,000,324	Generator, Signal, Variable Rate	10.4.1 91
Standard Electric Time Co.		
S-10	Timer, Precision	8.2 527
Stoddart Aircraft Radio Co.		
NM-60A	Radio Frequency Measuring Set	5.1.3 93
NM-62A	Radio Interference Measuring Set	5.1.3 97

Manufacturer and Model	Name	Functional Classification	
Superior Electric Co., The			
S16039	Transformer, Variable	12.1.4	93
Taylor Instrument Companies			
21009	Thermometer Set	15.1	215
21019	Thermometer Set	15.1	219
Tektronix, Inc.			
121	Preamplifier	7.1.3	395
180	Time-Mark Generator	4.3.2	555
315D	Oscilloscope	3.2	147
511AD	Cathode-Ray Oscilloscope	3.2	151
513D	Oscilloscope	3.2	155
514AD	Oscilloscope	3.2	159
515A	Oscilloscope	3.2	163
524AD	Synchroscope	3.2	167
535	Oscilloscope	3.2	171
545A	Oscilloscope	3.2	175
Teletronics Laboratory, Inc.			
DT-100A	Diode Tester	10.2.9	375
DT-257	Diode Test Set	10.2.9	377
TO-100	Oscillator, Test	4.2.1	415
Teletype Corp.			
14	Monitoring Printer	10.3.3	565
Triplett Company			
310	Volt-Ohm-Milliammeter	1.3.2.1	265
Vector Electronic Co.			
T-789	Tube Socket Adapter Kit	11.3.2	545
T-789-S	Kit, Tube Adapter, Pin Extension	11.3.2	547
Vectron, Inc.			
SA-20	Spectrum Analyzer	3.4.1	201
Wac Engineering Company			
C-9	Cable Tensiometer	16.1.1	247

Manufacturer and Model	Name	Functional Classification	
Wallace and Tiernan, Incorporated			
FA-145501	Precision Dial Manometer	17	269
FA-145511	Precision Dial Manometer	17	273
FA-145541	Precision Dial Manometer	17	277
Waveforms, Inc.			
510-B	Audio Oscillator	4.2.1	417
Weinschel Engineering Co.			
BA-5	Attenuation Calibrator	13.13	565
Western Electric Co.			
111A2	Relay Test Set	10.2.6	273
Westinghouse Electric Corp.			
PX-5	Ammeter	1.2.3	165
Weston Electrical Instrument Corp.			
4 Type 3	Standard Cell	13.1	417
45	DC Voltmeter	1.1.3	117
301	DC Ammeter	1.2.3	167
341	Voltmeter	1.1.5	129
425	Thermo-Milliammeter	1.2.2	143
433	AC Voltmeter	1.1.2	101
528	AC Voltmeter	1.1.2	103
614	Foot-Candle Meter	14.5	191
622	DC Microammeter	1.2.3	169
633 Type A1	AC Clamp Ammeter	1.2.2	145
703 Type 7	Sightmeter	14.5	193
904	AC Voltmeter	1.1.2	105
931	Ammeter	1.2.3	171
2261	Thermometer	15.1	221

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